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SMITHSONIAN INSTITUTION

UNITED STATES NATIONAL MUSEUM

Bulletin 99

Part 1

EAST AFRICAN MAMMALS IN THE UNITED ST NATIONAL MUSEUM

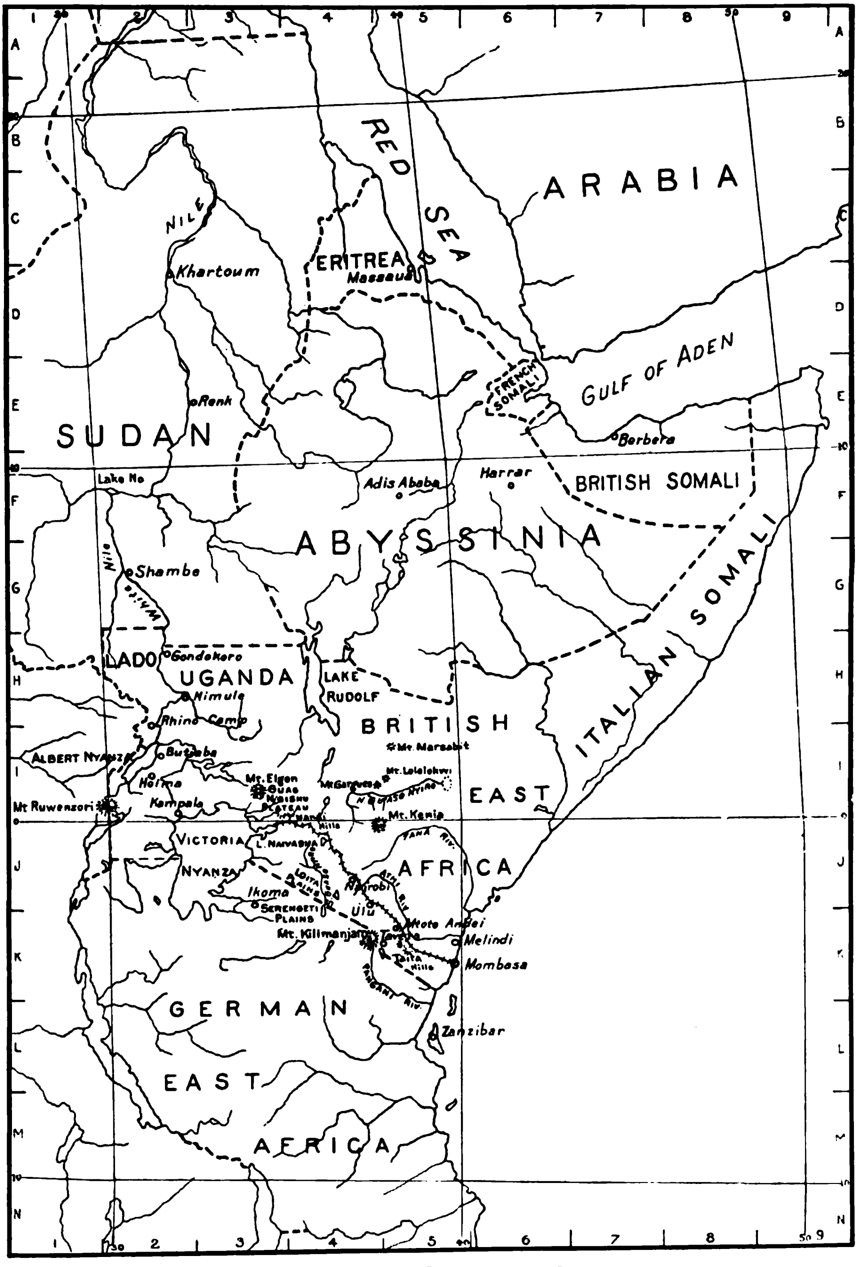
PART I. INSECTIVORA, CHIROPTERA, AND CARNIVORA

BY

N. HOLLISTER

Superintendent, National Zoological Park, Washington

WASHINGTON
GOVERNMENT PRINTING OFFICE
1918



MAP OF EASTERN EQUATORIAL AFRICA.

FOR EXPLANATION OF PLATE SEE PAGE 19.

SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM
Bulletin 99

EAST AFRICAN MAMMALS IN THE UNITED STATES NATIONAL MUSEUM

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WASHINGTON
GOVERNMENT PRINTING OFFICE
1918

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BULLETIN OF THE UNITED STATES NATIONAL MUSEUM.

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ADVERTISEMENT.

The scientific publications of the United States National Museum consist of two series, the *Proceedings* and the *Bulletins*.

The *Proceedings*, the first volume of which was issued in 1878, are intended primarily as a medium for the publication of original, and usually brief, papers based on the collections of the National Museum, presenting newly acquired facts in zoology, geology, and anthropology, including descriptions of new forms of animals, and revisions of limited groups. One or two volumes are issued annually and distributed to libraries and scientific organizations. A limited number of copies of each paper in pamphlet form, is distributed to specialists and others interested in the different subjects as soon as printed. The date of publication is recorded in the tables of contents of the volumes.

The *Bulletins*, the first of which was issued in 1875, consist of a series of separate publications comprising chiefly monographs of large zoological groups and other general systematic treatises (occasionally in several volumes), faunal works, reports of expeditions, and catalogues of type-specimens, special collections, etc. The majority of the volumes are octavos, but a quarto size has been adopted in a few instances in which large plates were regarded as indispensable.

Since 1902 a series of octavo volumes containing papers relating to the botanical collections of the Museum, and known as the *Contributions from the National Herbarium*, has been published as bulletins.

The present work forms No. 99 of the *Bulletin* series.

RICHARD RATHBUN,
Assistant Secretary, Smithsonian Institution,
In charge of the United States National Museum.

WASHINGTON, D. C., *June 12, 1918.*

TABLE OF CONTENTS.

Page.

Introduction.......... 11

Geographical limits.......... 12

Brief historical account of the collection.......... 13

Summary of specimens listed in Part I.......... 18

List of localities.......... 19

Order Insectivora.......... 25

Family Erinaceidæ.......... 25

1. Erinaceus albiventris hindei Thomas.......... 26

Family Macroscelidæ.......... 28

2. Rhynchocyon petersi petersi Bocage.......... 28
3. Cercoctenus sultan sultan (Thomas).......... 29
4. Cercoctenus sultan sangi (Heller).......... 29
5. Nasilio brachyrhynchus delamerei (Thomas).......... 31
6. Nasilio brachyrhynchus albiventer Osgood.......... 31
7. Elephantulus rufescens rufescens (Peters).......... 33
8. Elephantulus rufescens mariakanæ Heller.......... 33
9. Elephantulus rufescens phæus Heller.......... 33
10. Elephantulus rufescens dundasi Dollman.......... 35
11. Elephantulus rufescens boranus (Thomas).......... 36
12. Elephantulus rufescens rendilis Lönnberg.......... 36
13. Elephantulus rufescens delicatus Dollman.......... 36

Family Soricidæ.......... 37

14. Surdisorex noræ Thomas.......... 37
15. Surdisorex polulus Hollister.......... 37
16. Sylvisorex gemmeus Heller.......... 39
17. Sylvisorex mundus Osgood.......... 39
18. Pachyura lixa æquatoria Heller.......... 41
19. Crocidura nyansæ nyansæ Neumann.......... 42
20. Crocidura nyansæ kijabæ Allen.......... 43
21. Crocidura daphnia Hollister.......... 45
22. Crocidura sururæ Heller.......... 46
23. Crocidura hindei Thomas.......... 46
24. Crocidura lutrella Heller.......... 46
25. Crocidura parvipes parvipes Osgood.......... 47
26. Crocidura parvipes nisa Hollister.......... 47
27. Crocidura percivali Dollman.......... 50
28. Crocidura suahelæ Heller.......... 50
29. Crocidura simiolus Hollister.......... 51
30. Crocidura mutesæ Heller.......... 51
31. Crocidura turba nilotica Heller.......... 51
32. Crocidura turba zaodon Osgood.......... 54
33. Crocidura fumosa fumosa Thomas.......... 55
34. Crocidura fumosa schistacea Osgood.......... 59
35. Crocidura fumosa selina Dollman.......... 59
36. Crocidura raineyi Heller.......... 60
37. Crocidura jacksoni Thomas.......... 60
38. Crocidura hildegardeæ hildegardeæ Thomas.......... 64

Order Insectivora—Continued.

Family Soricidæ—Continued.

Page.
39. Crocidura hildegardeæ altæ Heller ... 65
40. Crocidura bicolor elgonius Osgood ... 65
41. Crocidura bicolor planiceps Heller ... 67
42. Crocidura allex allex Osgood ... 67
43. Crocidura allex alpina Heller ... 68
44. Crocidura roosevelti (Heller) ... 68
45. Crocidura maurisca Thomas ... 68
46. Crocidura littoralis Heller ... 70
Order Chiroptera ... 70
Family Pteropidæ ... 70
47. Rousettus angolensis (Bocage) ... 70
48. Eidolon helvum (Kerr) ... 71
49. Epomophorus wahlbergi haldemani (Hallowell) ... 71
50. Epomophorus minor Dobson ... 71
51. Epomophorus anurus Heuglin ... 71
Family Rhinopomidæ ... 71
52. Rhinopoma cystops Thomas ... 72
Family Emballonuridæ ... 72
53. Coleura afra (Peters) ... 72
54. Taphozous mauritianus Geoffroy ... 73
55. Taphozous perforatus Geoffroy ... 73
Family Petaliidæ ... 73
56. Petalia arge (Thomas) ... 73
57. Petalia nana Andersen ... 73
58. Petalia hispida (Schreber) ... 74
59. Petalia aurita Andersen ... 74
60. Petalia æthiopica æthiopica (Dobson) ... 74
61. Petalia æthiopica luteola (Thomas) ... 74
Family Megadermidæ ... 76
62. Lavia frons rex Miller ... 77
63. Lavia frons affinis Andersen and Wroughton ... 80
64. Cardioderma cor (Peters) ... 81
Family Rhinolophidæ ... 81
65. Rhinolophus hildebrandtii Peters ... 84
66. Rhinolophus eloquens Andersen ... 84
67. Rhinolophus keniensis Hollister ... 84
68. Rhinolophus lobatus Peters ... 84
Family Hipposideridæ ... 85
69. Hipposideros caffer (Sundevall) ... 85
70. Hipposideros ruber (Noack) ... 85
71. Hipposideros commersonii marungensis (Noack) ... 88
72. Asellia tridens (Geoffroy) ... 88
Family Vespertilionidæ ... 88
73. Myotis hildegardeæ Thomas ... 89
74. Pipistrellus nanus (Peters) ... 89
75. Pipistrellus helios Heller ... 90
76. Pipistrellus aero Heller ... 90
77. Pipistrellus kuhlii fuscatus Thomas ... 90
78. Pipistrellus rüppelii (Fischer) ... 90
79. Eptesicus phasma Allen ... 92
80. Eptesicus tenuipinnis (Peters) ... 92
81. Eptesicus capensis somalicus (Thomas) ... 92

Order Chiroptera—Continued.

Family Vespertilionidæ—Continued.

Page.
82. Eptesicus ugandæ Hollister........ 92
83. Eptesicus grandidieri (Dobson)........ 93
84. Nycticeius africanus Allen........ 93
85. Scotœcus hindei Thomas........ 94
86. Scotœcus albigula Thomas........ 94
87. Scotophilus nigrita colias Thomas........ 94
88. Miniopterus natalensis arenarius Heller........ 95
Family Molossidæ........ 95
89. Chærephon pumilus pumilus (Cretzschmar)........ 95
90. Chærephon pumilus naivashæ Hollister........ 98
91. Chærephon hindei (Thomas)........ 98
92. Chærephon limbatus (Peters)........ 98
93. Chærephon emini (de Winton)........ 98
94. Nyctinomus ægyptiacus Geoffroy........ 100
Order Carnivora........ 101
Family Canidæ........ 101
95. Thos adustus bweha Heller........ 101
96. Thos adustus notatus Heller........ 102
97. Thos aureus variegatus (Cretzschmar)........ 102
98. Thos aureus bea Heller........ 102
99. Thos mesomelas elgonæ Heller........ 103
100. Thos mesomelas mcmillani Heller........ 103
101. Lycaon pictus lupinus Thomas........ 109
102. Otocyon canescens Cabrera........ 111
103. Otocyon virgatus Miller........ 111
Family Mustelidæ........ 112
104. Mellivora abyssinica Hollister........ 112
105. Mellivora sagulata Hollister........ 114
106. Ictonyx striatus albescens Heller........ 114
107. Aonyx capensis hindei (Thomas)........ 115
108. Aonyx capensis helios Heller........ 115
Family Viverridæ........ 115
109. Viverra civetta orientalis Matschie........ 116
110. Genetta dongalana neumanni Matschie........ 117
111. Genetta bettoni Thomas........ 118
112. Genetta stuhlmanni stuhlmanni Matschie........ 118
113. Genetta stuhlmanni erlangeri Matschie........ 119
114. Genetta pumila Hollister........ 120
115. Nandinia binotata arborea Heller........ 120
116. Mungos dentifer Heller........ 124
117. Mungos sanguineus parvipes Hollister........ 124
118. Mungos sanguineus ibeæ Wroughton........ 125
119. Mungos sanguineus orestes Heller........ 125
120. Mungos sanguineus rendilis Lönnberg........ 126
121. Mungos ichneumon funestus Osgood........ 126
122. Atilax paludinosus robustus (Gray)........ 126
123. Atilax paludinosus rubescens (Hollister)........ 127
124. Ichneumia albicauda ibeana (Thomas)........ 130
125. Ichneumia albicauda dialeucos (Hollister)........ 131
126. Helogale undulata affinis Hollister........ 132
127. Helogale undulata rufula Thomas........ 132
128. Helogale undulata atkinsoni Thomas........ 132

Order Carnivora—Continued.

Family Viverridæ—Continued.

Page.
129. Helogale hirtula ahlselli Lönnberg 134
130. Bdeogale jacksoni (Thomas) 135
131. Bdeogale crassicauda omnivora Heller 135
132. Crossarchus fasciatus colonus Heller 136
Family Protelidæ 138
133. Proteles cristatus termes Heller 138
Family Hyænidæ 139
134. Hyæna hyæna schillingsi Matschie 139
135. Hyæna hyæna bergeri Matschie 139
136. Hyæna dubia Schinz 140
137. Crocuta crocuta germinans (Matschie) 143
138. Crocuta crocuta fisi Heller 145
139. Crocuta crocuta leontiewi (Satunin) 145
Family Felidæ 150
140. Acinonyx jubatus raineyi Heller 151
141. Acinonyx jubatus velox Heller 152
142. Acinonyx jubatus soemmeringii (Fitzinger) 152
143. Felis leo massaica Neumann 155
144. Felis leo nyanzæ Heller 163
145. Felis leo somaliensis Noack 164
146. Felis leo roosevelti Heller 165
147. Felis pardus pardus Linnæus 170
148. Felis pardus chui Heller 170
149. Felis pardus suahelica Neumann 171
150. Felis fortis Heller 175
151. Felis capensis hindei Wroughton 175
152. Felis ocreata nandæ Heller 178
153. Felis ocreata taitæ Heller 178
154. Felis torquata Cuvier 178
155. Lynx caracal nubicus (Fischer) 180
Explanation of plates 181
Index 187

LIST OF ILLUSTRATIONS.

TEXT FIGURES.

Page.

1. Map of Africa with shaded area showing the region covered by this report.. 12
2. Cross section of zygomatic arch of wild-killed lion skull.................. 159
3. Cross section of zygomatic arch of park-reared lion skull.................. 159

PLATES.

Facing page.

1. Map of Eastern Equatorial Africa.. 1
2. Mounted hyenas in United States National Museum.......................... 140
3. Palatal views of skulls of *Hyæna*.. 142
4. Group of mounted East African lions in United States National Museum.. 157
5. Mounted East African leopard and cheetah in United States National Museum.. 172
6. Erinaceus sotikæ Heller=*Erinaceus albiventris hindei*.................... 186
   Petrodomus sultani sangi Heller=*Cercoctenus sultan sangi.*
   Elephantulus rufescens mariakanæ Heller.
   Elephantulus phæus Heller=*Elephantulus rufescens phæus.*
7. Surdisorex polulus Hollister.. 186
   Sylvisorex gemmeus Heller.
   Pachyura lixa æquatoria Heller.
   Crocidura daphnia Hollister.
   Crocidura sururæ Heller.
   Crocidura lutrella Heller.
   Crocidura parvipes nisa Hollister.
   Crocidura suahelæ Heller.
   Crocidura simiolus Hollister.
8. Crocidura mutesæ Heller... 186
   Crocidura nilotica Heller=*Crocidura turba nilotica.*
   Crocidura turba lakiundæ Heller=*Crocidura turba zaodon.*
   Crocidura alchemillæ Heller=*Crocidura fumosa fumosa.*
   Crocidura raineyi Heller.
   Crocidura maanjæ Heller=*Crocidura hildegardeæ hildegardeæ.*
   Crocidura lutreola Heller=*Crocidura hildegardeæ hildegardeæ.*
   Crocidura hildegardeæ procera Heller=*Crocidura hildegardeæ hildegardeæ.*
9. Heliosorex roosevelti Heller=*Crocidura roosevelti*........................ 186
10. Crocidura hildegardeæ altæ Heller.. 186
    Crocidura planiceps Heller=*Crocidura bicolor planiceps.*
    Crocidura alpina Heller=*Crocidura allex alpina.*
    Crocidura littoralis Heller.
    Lavia rex Miller=*Lavia frons rex.*
    Rhinolophus keniensis Hollister.
    Pipistrellus helios Heller.
    Pipistrellus aero Heller.
    Eptesicus ugandæ Hollister.
    Miniopterus natalensis arenarius Heller.

Facing page.
11. Chærephon pumilus naivashæ Hollister.................................. 186
Ictonyx capensis albescens Heller=*Ictonyx striatus albescns.*
12–13. Thos adustus bweha Heller.. 186
14–15. Thos adustus notatus Heller... 186
16–17. Thos aureus bea Heller.. 186
18–19. Thos mesomelas elgonæ Heller.. 186
20–21. Thos mesomelas mcmillani Heller..................................... 186
22–24. Otocyon virgatus Miller... 186
25. Mellivora abyssinica Hollister... 186
26–27. Mellivora sagulata Hollister.. 186
28–29. Aonyx capensis helios Heller.. 186
30. Genetta pumila Hollister... 186
31. Nandinia binotata arborea Heller....................................... 186
32. Mungos dentifer Heller... 186
Mungos sanguineus parvipes Hollister.
33. Mungos sanguineus orestes Heller....................................... 186
34. Mungos paludinosus rubescens Hollister=*Atilax paludinosus rubescens*..... 186
Bdeogale crassicauda omnivora Heller.
35. Mungos albicaudus ferox Heller=*Ichneumia albicauda ibeana*.............. 186
36. Mungos albicaudus dialeucos Hollister=*Ichneumia albicauda dialeucos*...... 186
Helogale undulata affinis Hollister.
37–38. Crossarchus fasciatus colonus Heller................................ 186
Proteles cristatus termes Heller.
39–40. Crocuta crocuta fisi Heller... 186
41. Acinonyx jubatus raineyi Heller.. 186
42. Acinonyx jubatus velox Heller.. 186
43. Felis leo roosevelti Heller.. 186
44–45. Felis pardus chui Heller.. 186
46–47. Felis pardus fortis Heller=*Felis fortis*........................... 186
48–49. Felis ocreata nandæ Heller.. 186
50–51. Felis ocreata taitæ Heller.. 186
52. Skull of wild-killed male East African lion............................ 186
53. Skull of park-reared male East African lion............................ 186
54. Skulls of park-reared and wild-killed East African lionesses........... 186
55. Skulls of wild-killed and park-reared lions (occipital views)........... 186

EAST AFRICAN MAMMALS IN THE UNITED STATES NATIONAL MUSEUM.

PART I. INSECTIVORA, CHIROPTERA, AND CARNIVORA.

By N. HOLLISTER,
Superintendent, National Zoological Park, Washington.

INTRODUCTION.

Many special papers on the extensive collection of mammals from Eastern Equatorial Africa preserved in the United States National Museum have been published since the accumulation of this material began. These papers have been written by various specialists, and for the greater part consist of descriptions of new forms or reports on the collections of certain expeditions. No attempt has before been made to furnish a list of all the material in the museum, based on what amounts to monographic work in each group and careful identification of every specimen. Such a list is the basis of the proposed work of which the present section is the first part. It is hoped that the entire East African collection can be listed in a similar manner in a bulletin completed in three parts. Part I consists of the reports on the insectivorous mammals (Order Insectivora), the bats (Order Chiroptera), and the carnivores (Order Carnivora).

In addition to the lists of specimens carefully determined according to modern standards of systematic mammalogy, pertinent notes which seem worthy of preservation for future workers on the taxonomy and life histories of East African mammals are presented under the various generic, specific, and subspecific headings. What it is hoped will prove even more useful to systematic mammalogists are the extensive tables of measurements of individual specimens which have been made as a basis for preliminary work in each group, and which are published with the report.

The material in the collection, consisting almost wholly of well-prepared specimens with accurate data, has been assembled during many years from numerous sources. While many sections of the area treated are almost unrepresented in the collection by specimens of most groups, the mass of material accumulated from certain large areas far surpasses in numbers and importance that preserved in any other museum. This is the natural result of the efforts of the competent field naturalists who accompanied the larger and more extensive expeditions, and the foresight and energy of the museum authorities in the organization and maintenance of the work.

GEOGRAPHICAL LIMITS.

East Africa, or rather Eastern Equatorial Africa, in the present connection includes all the area indicated in figure 1. This territory is divided politically among several nations. In listing specimens the following major divisions are regularly used in the sequence indicated: Eritrea, French Somali, British Somali, Sudan, Abyssinia, Lado, Uganda, Italian Somali, British East Africa, Zanzibar, German East Africa.

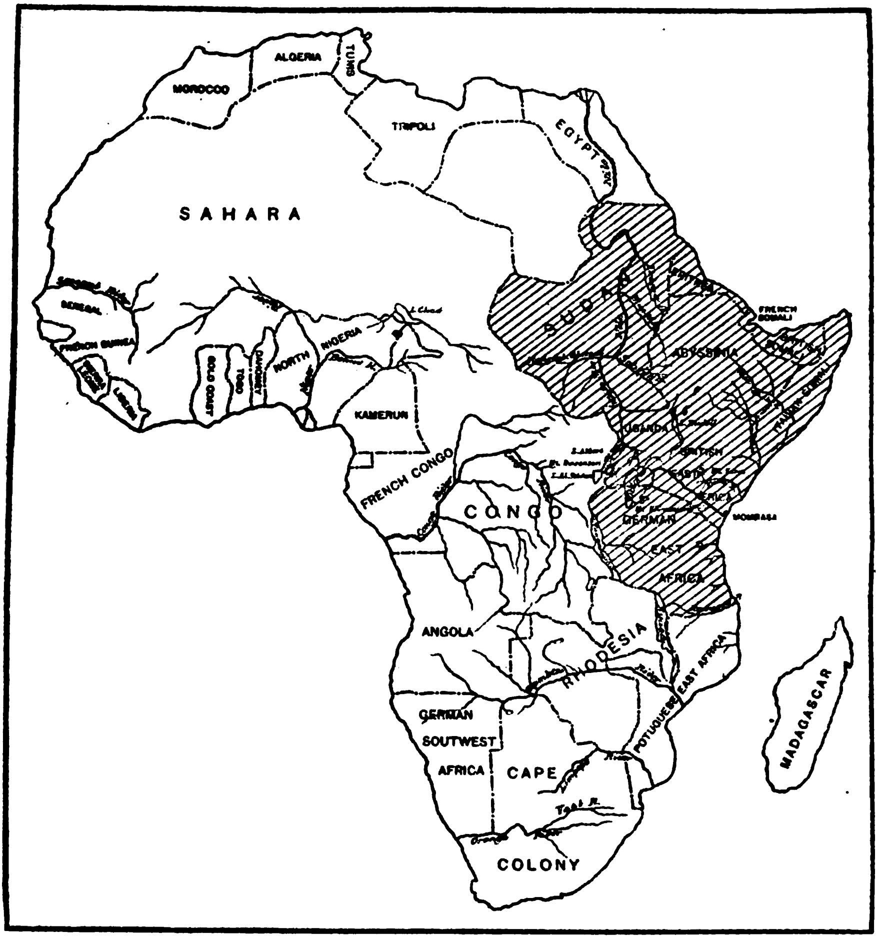

FIG. 1.—MAP OF AFRICA WITH SHADED AREA SHOWING THE REGION COVERED BY THIS REPORT.

BRIEF HISTORICAL ACCOUNT OF THE COLLECTION.

In addition to minor accessions, often of great value, the bulk of the material in the East African mammal collections has been gathered by special zoological exploring expeditions, organized by patrons of the museum or by the Smithsonian Institution itself.

The first important mammal collection to reach the museum from eastern Africa was made by Dr. W. L. Abbott on his journey to Mount Kilimanjaro, 1887–1890, and was presented by him to the museum. It contained about 170 specimens, which were reported upon in 1892 by Dr. F. W. True.[1] Five new species were described at this time from Doctor Abbott's collection, one of which (*Cephalophus spadix*) has only recently been rediscovered.

Doctor Abbott left Zanzibar in the last days of November, 1887, and marched from Saadani, on the coast, to Kidudwe, about 90 miles inland, where he remained about five weeks. A side trip of two marches was made from here into the Nguru Mountains. He returned to Zanzibar in January, 1888. In February, 1888, he marched from Pangani, German East Africa, up the valley of the Ruva River (Pangani River) to Taveta. From Taveta numerous expeditions about the southern slopes of Kilimanjaro (Chaga), to Aruchu-wa-chini, and about the plains east of Kilimanjaro were made. A march down to the coast at Mombasa was made during the last days of January, 1889, and the next month he returned to Taveta. Trips were again made into Aruchu-wa-chini and to southeastern Chaga, and he then marched from Taveta northward to Kimangelia and to a swamp some 50 miles north of Kilimanjaro. The return to Taveta was made by way of the Kyulu Mountains (Ongolea Mountains on some maps). This was followed by a six months' stay in and about Moschi, in Chaga, south of Kilimanjaro, and the return to Mombasa in February, 1890. Altogether, many hundreds of miles of marches were made in the neighborhood of Kilimanjaro, and large collections of birds and other material, as well as of mammals, were made. The birds have been reported upon by Dr. H. C. Oberholser.[2]

In 1893 Doctor True published a short paper [3] describing a small collection of mammals made by William Astor Chanler and Lieut. Ludwig von Höhnel on the Tana River. This material was presented to the United States National Museum by the collectors.

During the summer of 1908, while on a sporting trip to the Guas Ngishu and Laikipia Plateaus, British East Africa, Mr. John Jay White preserved specimens of large mammals, about 30 in number, which he presented to the Museum. These were reported upon by the present writer in 1910.[1] On subsequent trips Mr. White added to this collection.

---

[1] Proc. U. S. Nat. Mus., vol. 15, pp. 445–480. 1892.

[2] Birds collected by Dr. W. L. Abbott in the Kilimanjaro region, East Africa, Proc. U. S. Nat. Mus., vol. 28, pp. 823–936. 1905.

[3] Proc. U. S. Nat. Mus., vol. 16, pp. 601–603. 1893

A few mammals collected by the Hon. Hoffman Philip, minister resident and consul general, Adis Ababa, Abyssinia, were presented by him to the Museum in 1910.

The Hon. Alexander W. Weddell, American consul at Zanzibar, sent to the National Museum as a gift a few mammals collected by himself during the year 1911.

By far the most important contributions to the East African collection were made by two larger and more thoroughly equipped expeditions in the field from 1909 to 1912—the Smithsonian African Expedition and the Paul J. Rainey Expedition.

The Smithsonian African Expedition, which was first officially proposed by President Roosevelt in a letter to the Secretary of the Smithsonian Institution dated June 20, 1908,[2] was made possible through the generosity of friends of the Smithsonian Institution, who provided a special fund to pay for the outfitting and to meet the expenses of the naturalists who accompanied the expedition. The management of the expedition was under the direction of Col. Theodore Roosevelt, who defrayed all of his own expenses and those of his son, Mr. Kermit Roosevelt. The naturalists who accompanied him in the interests of the museum were Lieut. Col. Edgar A. Mearns, United States Army, retired; Mr. Edmund Heller; and Mr. J. Alden Loring. Doctor Mearns gave special attention to birds; Mr. Heller to the preservation of the larger mammals killed by Colonel Roosevelt and Kermit Roosevelt; and Mr. Loring devoted his time mainly to the collection of small mammals.

The party sailed from New York on March 23, 1909, landed in Mombasa on April 21, and journeyed over the Uganda railroad to Kapiti Plains, British East Africa, where a preliminary camp was established. Actual work commenced on the near by Athi Plains on April 24, when Colonel Roosevelt procured the first antelopes for the collection. Hunting and collecting were carried on in this general region until almost June 1, during which time the country east and northeast of Nairobi was well covered.

After several days' collecting at Nairobi the party left on the railroad for Kijabe, June 3. On June 5 the safari started for the Sotik. Collections were constantly made throughout the journey southward to the Loita Plains, the members of the expedition separating into groups and making camps at the most favorable localities for special work. On the return trip to the railroad, which was reached at Naivasha Station about August 1, considerable time was spent in work at Lake Naivasha. The safari left Naivasha for the north on

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[1] Smithsonian Misc. Coll., vol. 56, No. 2, pp. 1-12. March 31, 1910.

[2] Report of the Secretary of the Smithsonian Institution for the year ending June 30, 1909, p. 8. 1909.

August 8, crossed the Naivasha Plains and the Aberdare Mountains, and reached Nyeri on August 11. Operations were carried on in this northern country until late in October. The party, as before, divided as seemed best to cover the ground thoroughly, and the Laikipia Plateau, Northern Guaso Nyiro, and Mount Kenia regions were very carefully worked.

The next region to be covered was the Guas Ngishu Plateau. Leaving Nairobi on October 25 the expedition moved westward over the railroad to Londiana. The next day the safari left Londiana and moved northward toward Ravine. The Elgeyo Escarpment and Guas Ngishu Plateau were worked in a manner similar to the other regions, and much collecting was done, especially along the Nzoia River. The return to the railroad was made in late November. During the first half of December much miscellaneous collecting was done by the members of the expedition at various points along the railway. This included a special trip by Kermit Roosevelt to the coast region below Mombasa for sable antelopes.

On December 18 the expedition left Nairobi on the railway for Victoria Nyanza. The lake was crossed to Entebbe and headquarters established at Kampala December 21. March was made across Uganda by way of Hoima to Butiaba, which was reached January 5, 1910. The journey down the Nile now began and the expedition reached Wadelai on January 8. From here a special trip into the Lado Enclave was made. The principal object of this trip was the white rhinoceros, but all the members of the expedition made the most of the opportunity and gathered large collections. The journey down the Nile, by boat and by land, was resumed on February 3, and collections were made at every opportunity. Gondokoro was reached on February 17. While the small mammal and bird collectors remained in the vicinity of Gondokoro Colonel Roosevelt led an expedition on a side trip across the Nile and inland from Rejaf after giant elands. The northward journey was resumed on February 28; collections were made at frequent intervals and at several especially important localities; and the party disbanded at Khartoum the latter part of March, 1910.

Colonel Roosevelt's preliminary report to the Secretary of the Smithsonian Institution, dated Khartoum, March 15, 1910, was as follows:[1]

> I have the honor to report that the Smithsonian African expedition, which was intrusted to my charge, has now completed its work. Full reports will be made later by the three naturalists, Messrs. Mearns, Heller, and Loring. I send this preliminary statement to summarize what has been done; the figures given are substantially accurate, but they may have to be changed slightly in the final reports.
>
> We landed in Mombasa on April 21, 1909, and reached Khartoum on March 14, 1910. On landing, we were joined by Messrs. R. J. Cuninghame and Leslie J. Tarlton; the

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[1] Report of the Secretary of the Smithsonian Institution for the year ending June 30, 1910, pp. 10–11. 1910.

former was with us throughout our entire trip, the latter until we left East Africa, and both worked as zealously and efficiently for the success of the expedition as any other member thereof.

We spent eight months in British East Africa. We collected carefully in the various portions of the Athi and Kapiti plains, in the Sotik and around Lake Naivasha. Messrs. Mearns and Loring made a thorough biological survey of Mount Kenia, while the rest of the party skirted its western base, went to and up the Guaso Nyero and later visited the Uasin Gishu region and both sides of the Rift Valley. Messrs Kermit Roosevelt and Tarlton went to the Leikipia Plateau and Lake Hannington, and Dr. Mearns and Kermit Roosevelt made separate trips to the coast region near Mombasa. On December 19 the expedition left East Africa, crossed Uganda and went down the White Nile.

North of Wadelai we stopped and spent over three weeks in the Lado, and from Gondokoro Kermit Roosevelt and I again crossed in to the Lado, spending eight or ten days in the neighborhood of Rejaf. In Gondokoro we were met by the steamer which the Sirdar, with great courtesy, had put at out disposal. On the way to Khartoum we made collections in Lake No, and on the Bahr-el-Ghazal and Bahr-el-Zeraf. We owe our warmest thanks for the generous courtesy shown us and the aid freely given us, not only by the Sirdar, but by all the British officials in East Africa, Uganda, and the Sudan, and by the Belgian officials in the Lado; and this, of course, means that we are also indebted to the home governments of Egypt and Belgium.

On the trip Mr. Heller has prepared 1,020 specimens of mammals, the majority of large sizes; Mr. Loring has prepared 3,163, and Doctor Mearns, 714, a total of 4,897 mammals. Of birds, Doctor Mearns has prepared nearly 3,100; Mr. Loring, 899; and Mr. Heller about 50, a total of about 4,000 birds.

Of reptiles and batrachians, Messrs. Mearns, Loring, and Heller collected about 2,000.

Of fishes, about 500 were collected. Doctor Mearns collected marine fishes near Mombasa and fresh-water fishes elsewhere in British East Africa, and he and Cuninghame collected fishes in the White Nile. This makes in all of vertebrates: Mammals, 4,897; birds, about 4,000; reptiles and batrachians, about 2,000; fishes, about 500; total 11,397.

The invertebrates were collected carefully by Doctor Mearns, with some assistance from Messrs. Cuninghame and Kermit Roosevelt. A few marine shells were collected near Mombasa, and land and fresh-water shells throughout the regions visited, as well as crabs, beetles, millipeda, and other invertebrates.

Several thousand plants were collected throughout the regions visited by Doctor Mearns, who employed and trained for the work a Wunyamvezi named Makangarri, who soon learned how to make very good specimens and turned out an excellent man in every way.

Anthropological materials were gathered by Doctor Mearns, with some assistance from others. A collection was contributed by Major Ross, an American in the government service at Nairobi.

A complete account of the essential features of the expedition has been given by Colonel Roosevelt in his "African Game Trails."[1] Accounts of the larger mammals are given in manual form in Roosevelt and Heller's "Life-Histories of African Game Animals."[2] Numerous new species and subspecies of mammals collected on this expedition have been described by Mr. Heller in a series of special papers in the Smithsonian Miscellaneous Collections, 1909–1914. Other specialists have described forms in certain groups, mostly in the same serial publication.

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[1] African Game Trails, New York and London, 1910.

[2] Life- Histories of African Game Animals, 2 vols., New York. 1914.

The Paul J. Rainey Expedition to East Africa was planned by Mr. Rainey as a hunting and collecting trip, and he offered to present to the institution the natural history material obtained if the museum could send a trained field naturalist with his party. The services of Mr. Edmund Heller as a collector were again obtained, and the results of his work later fully justified the selection. All of the expenses were met by Mr. Rainey.

> The collection made has been estimated to contain some 4,700 skins of mammals, together with many birds, reptiles, and other animals, making very valuable additions to the present African collections in the Museum. Nearly all of the material is from localities not covered by earlier expeditions, and some of it comes from points never before visited by naturalists. The collection includes the famous series of lions taken by Mr. Rainey with his American hounds, as described in his well-known lectures. There are also many specimens of different kinds of antelopes, including the hartebeests, wildebeestes, and waterbucks, as well as buffaloes, zebras, cheetahs, monkeys, and rodents. A few hippopotamus and rhinoceros skins and one elephant were also collected.[1]

The Rainey Expedition remained in the field about a year, having sailed from New York for Mombasa on February 18, 1911, and dispersing about February 15, 1912, at Nairobi. The region explored was mostly to the north and east of that covered by the Smithsonian African Expedition and included the country lying to the north of Mount Kenia toward the Abyssinian border. Important work also was done in the vicinity of Kavirondo Gulf; along the German East African border; in the Taita Hills; and along the coast region, near Mombasa.

Numerous new forms of mammals have been named in preliminary papers on the results of this expedition by Mr. Heller and others.

During the summer of 1914 Mr. Elton Clark and Mr. Thomas P. Lindsay, both of Boston, visited German East Africa on a hunting trip. They were fully equipped for collecting mammals, large and small. Their work unfortunately was cut short by the war, but a number of desirable specimens which reached the outside were presented to the Museum. These are mostly from the vicinity of Speke Gulf and from the Serengeti Plains, and are therefore of great interest to the Museum, as nothing had been previously received from that part of German East Africa.

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[1] Report of the Secretary of the Smithsonian Institution for the year ending June 30, 1912, p. 8. 1912.

SUMMARY OF SPECIMENS LISTED IN PART I.

The mammals of the orders Insectivora, Chiroptera, and Carnivora, listed in these pages, were received by the museum from expeditions and collectors as follows:

	Insectivora.	Chiroptera.	Carnivora.	Totals.
Smithsonian African Expedition under the direction of Col. Theodore Roosevelt:				
Col. Theodore Roosevelt			16	16
Kermit Roosevelt			26	26
Lieut. Col. Edgar A. Mearns, U. S. A	20	63	36	119
Edmund Heller	51	74	34	159
J. Alden Loring	334	262	48	644
W. N. McMillan			6	6
S. Medlicott		1		1
Paul J. Rainey African Expedition:				
Paul J. Rainey			79	79
Edmund Heller	321	117	207	645
Dr. M. E. Johnston			11	11
A. J. Klein			4	4
Dr. S. L. Hinde			1	1
Dr. W. L. Abbott	3	3	22	28
H. J. A. Turner	5	14	3	22
John Jay White			13	13
Hon. Alexander W. Weddell		10		10
William Astor Chanler		6		6
A. B. Percival	4	1		5
Elton Clark			4	4
D. V. Raggazzi		4		4
G. Schrader			4	4
Hon. Hoffman Philip			3	3
Hon. N. Charles Rothschild		3		3
Thomas P. Lindsay			2	2
Viaggio de L. Ruspoli		2		2
National Zoological Park (collector unknown)			2	2
E. S. Cunningham			2	2
R. E. Dent		1	1	2
James L. Clark	1			1
Emperor Menelik			1	1
Sir Francis Reginald Wingate			1	1
R. B. Woosnam		1		1
Capt. H. G. C. Swayne			1	1
R. A. Gross			1	1
G. E. Dobson (received from)		1		1
Mus. Civ. di Storia Nat. Genoa (received from)		1		1
British Museum (received from; collected by—Salmin)		1		1
W. F. H. Rosenberg (received from)			1	1
	739	565	529	1,833

SUMMARY.

Insectivores, bats, and carnivores from Smithsonian African Expedition	971
Insectivores, bats, and carnivores from Paul J. Rainey Expedition	740
Insectivores, bats, and carnivores from miscellaneous sources	122
Total in the United States National Museum	1,833

There are included in the East African collections of insectivores, bats, and carnivores 64 type-specimens. Of the 64 new forms 2 were described by Gerrit S. Miller, jr.; 14 by N. Hollister; and 48 by Edmund Heller. They comprise 26 insectivores, 7 bats, and 31 carnivores.

Of these 64 described forms, 57 are recognized as valid species or subspecies in the present paper.

LIST OF LOCALITIES.

A list of all the localities from which National Museum specimens of insectivores, bats, and carnivores are mentioned in this report is given below, with index references to the accompanying map. (Plate 1.) Only a few of these places are marked on the map itself, but it will not be difficult to place with reasonable accuracy each locality mentioned. Maps of this region do not agree in essential details. A large collection of maps of all degrees of accuracy, including official sectional maps, as well as the collectors' catalogues and journals, have been used in this work. It is believed that each locality has been defined with fair accuracy, but slight mistakes have no doubt been made in the original manuscript map and therefore in the following dictionary. For general purposes this will not cause much annoyance, as the variations can be only of a comparatively few miles at the most, and amount to little on so small a map. There has never been any doubt about the approximate location of a given place, but owing to the great disagreement among maps, even of the better sort, it has been almost impossible to determine the localities with precision.

Aberdare Mountains—A range of mountains about half way between Lake Naivasha and Mount Kenia. Summits said to to be 11,000–12,000 feet. J 4.

Adis Ababa—Capital city of Abyssinia, situated near the geographical center of that country. Also written Addis Ababa and Addis Abeba. F 5.

Agate's—On the Southern Guaso Nyiro near the eastern edge of Loita Plains. J 4.

Archer's Post—On the Northern Guaso Nyiro near the mouth of the Lakiundu River, north of Mount Kenia. I 5.

Aruscha Wa-cini, or Aruscha-wa-chini—South of Mount Kilimanjaro, in German East Africa, near the upper Pangani River. K 4.

Athi Plains—North and east of Nairobi. J 4.

Athi River—See Athi Station, which is on Athi River. J 4.

Athi Station—On the Uganda railway, 16 miles southeast of Nairobi. It is also called Athi River. Altitude, 4,950 feet. J 4.

Bargunett River—A southern tributary of the Northern Guaso Nyiro, near the Meru Road, west of Mount Kenia. J 4.

Berbera—Seaport of British Somaliland, on the Gulf of Aden. E 7.

Bor—On the east bank of the Bahr el Jebel in Mongalla Province, Sudan, between Shambe and Gondokoro. G 2.

Burgunett River—See Bargunett River. J 4.

Butiaba—On the northeast shore of Albert Nyanza in Unyoro, Uganda. I 2.

Changamwe—Station on the railroad 6 miles inland from Mombasa. Altitude, 180 feet. K 5.

El Dueim—On the Bahr el Abiad (White Nile) somewhat more than 100 miles south of Khartoum, Sudan. D 2.

Engare Narok River—A tributary of the Southern Guaso Nyiro. On the west side of the Mau Escarpment midway between the Uganda Railroad and the border of German East Africa. J 4.

Engare Ndare River—A southern tributary of the Northern Guaso Nyiro, north of Mount Kenia. I 4.

Engarro Naroke River—See Engare Narok River. J 4.

Fort Hall—About midway between Nairobi and Mount Kenia. J 4.

Fort Hoima—See Hoima. I 2.

Fort Kampala—See Kampala. I 2.

Gondokoro—On the east bank of the Bahr el Jebel in extreme northwestern Uganda. H 2.

Guas Ngishu Boma—At the eastern edge of the Guas Ngishu Plateau near the Elgeyo Escarpment and north of Ravine Station. I 4.

Guas Ngishu Plateau—South and east of Mount Elgon, west of the Elgeyo Escarpment, and north of the Nandi Hills. Drained by the upper waters of the Nzoia River. I 3-4.

Habesch—In northern Eritrea; also the Abyssinian Empire. C 4-5.

Harrar—In eastern Abyssinia. F 6.

Hoima—In Unyora, western Uganda, not far from the eastern shore of Albert Nyanza. I 2.

Ikoma—In northern German East Africa, east of Speke Gulf, Victoria Nyanza. J 3.

Isiola River—A southern affluent of the Northern Guaso Nyiro, north of Mount Kenia, and west from the Lakiundu River. I 4-5.

Juja Farm—W. N. McMillan's place on the Athi Plains, about 23 miles northeast of Nairobi. J 4.

Kabalolot Hill—In the Sotik, west of Loita Plains and near the border of German East Africa. Headwaters of the Amala River. J 3-4.

Kabula Muliro—On the road about midway between Kampala and Hoima, Uganda; between Albert Nyanza and Victoria Nyanza. I 2.

Kaimosi—On the Lukosa River just north of the Equator and north of Port Florence, the western terminus of the railway in Kavirondo. I 3.

Kakumega—Just north of the Equator near Port Florence, the end of the railway in Kavirondo, Kisumu Province, northeast of Victoria Nyanza. I 3.

Kakumega River—See Kakumega. I 3.

Kamiti Farm—Ranch owned by H. H. Heatley on the Athi Plains. J 4.

Kampala—Fort Kampala, or Mengo, just north of Entebbe, Uganda, and near the northwestern edge of Victoria Nyanza. I 2.

Kampi Moto—Twenty miles north of Nakuru, a station on the railway northwest from Lake Naivasha. I-J 4.

Kampiya bibi—On the Guas Ngishu Plateau. I 3-4.

Kapiti—See Kapiti Plains. J 4.

Kapiti Plains—A station, also called Kapiti, or Kapiti Station, on the railway 29 miles southeast of Nairobi and 288 miles from Mombasa. Altitude, 5,350 feet. J 4.

Kara River, or Kara Water—On the Marsabit Road north of Mount Lololokwi. I 5.

Kasorongai River—On the west side of Mount Kenia and north of Nyeri. J 4.

Khartoum—On the White Nile in Sudan. D 2.

Kibabe—In the Nandi Hills, Kisumu Province, British East Africa, just north of the Equator and northeast from Victoria Nyanza. I 3.

Kijabe—A station on the Uganda railway in British East Africa between Nairobi and Lake Naivasha. Altitude, 6,790 feet. J 4.

Kijabe Station—See Kijabe. J 4.

Kilima Kui—In Ulu, British East Africa, northeast of Ulu Station on the railway and south of Machakos. J 4-5.

Kilimanjaro—See Mount Kilimanjaro. K 4.

Kiriba—On the east bank of the Bahr el Jebel, 10 miles south of Gondokoro, in extreme northwestern Uganda. Also called Kiriba Village. H 2.

Kisii District—In western British East Africa, near Kavirondo Bay. J 3.

Kisimbiri—North of Kampala and Entebbe, near the northwest corner of Victoria Nyanza, Uganda. Sometimes written Kisimbili. I 2.

Kisumu—A village on Ugowe Bay, northeastern shore of Victoria Nyanza and near Port Florence. Also a province of western British East Africa bordering on Victoria Nyanza. J 3.

Kitanga—Sir Alfred Pease's farm in the Mwa Hills on the Athi Plains, near Nairobi and Athi Station. J 4.

Koya Water—On the Marsabit Road north of Mount Lololokwi, British East Africa. I 5.

Laikipia—On the western edge of the Laikipia Plateau southeast of Lake Baringo. I 4.

Laikipia Plains—See Laikipia Plateau. I 4.

Laikipia Plateau—Northwest from Mount Kenia and north of the Aberdare Mountains. I 4.

Lake Naivasha—A lake and station, on the railway across British East Africa, 391 miles from Mombasa and almost 200 miles from Port Florence. The altitude of the railway station is given as 6,230 feet. J 4.

Lake No—In southern central Sudan, at junction of the Bahr el Ghazal, Bahr el Abiad, and Bahr el Jebel. F 2.

Lakiundu River—Rises in the Jambeni Mountains, northeast of Mount Kenia, and flows west and north into the Northern Guaso Nyiro at Archer's Post. I 5.

Ledgus—On the east bank of the Bahr el Jebel, between Gondokoro and Nimule, northwestern Uganda. H 2-3.

Lesiweru River—One of the numerous small streams flowing northwest from Mount Kenia and crossed by the Meru Road. I 4.

Lime Springs—Near the eastern edge of the Loita Plains, not far from the Southern Guaso Nyiro River. J 4.

Loita Plains—Near the German East African border in southwestern British East Africa, west of the Rift Valley and the Southern Guaso Nyiro River. J 4.

Longaya Water—On the Marsabit Road north of Mount Lololokwi. I 5.

Loroghi Mountains—About midway between Mount Kenia and the southern end of Lake Rudolf. I 4.

Lukosa River—South of the Nzoia River on Guas Ngishu Plateau, flowing into Victoria Nyanza. Also called Lukos River and Yala River. I 3.

Machakos Road—A railway station between Kiu and Kapiti Plains stations; the road leading from station to town of Machakos, north of the railway and southeast of Nairobi. J 4-5.

Maji-ya-chumvi—A station on the railroad 35 miles from Mombasa; altitude, 570 feet. K 5.

Mariakani—A station on the railroad 26 miles from Mombasa. K 5.

Marsabit Road—The road leading to Mount Marsabit, north of the Northern Guaso Nyiro River. I 5.

Massaua—Port on the Red Sea, Eritrea. C-D 5.

Mau Hills—The Mau Escarpment. In this connection the specimens labeled Mau Hills came from a point 15 miles north of Ravine Station. I 4.

Mayo River—One of the affluent streams of the Northern Guaso Nyiro rising in the Aberdare Mountains. J 4.

Mazeras—Station on the railroad 16 miles from Mombasa; altitude, 530 feet. K 5.

Mbalageti River—In northern German East Africa; rises at the western edge of the Serengeti Plains and flows westward into Speke Gulf, Victoria Nyanza. J–K 3.

Melindi—On the coast of British East Africa, north of Mombasa, at the mouth of the Sabaki River. Also written Malinda. K 5.

Merelle River, or **Merelle Water**—On the Marsabit Road, about midway between the northern Guaso Nyiro River and Mount Marsabit. I 5.

Meru—Just north of Mount Kenia. I–J 4–5.

Meru Road—Across the Laikipia Plateau to Meru, north of Kenia. I–J 4.

Mnyouri Jardin—On the east bank of the Bahr el Jebel, between Gondokoro and Nimule, and just south of Ledgus, northwest Uganda. H 2.

Mobuku Valley—Southeast side of Mount Ruwenzori, between Albert Nyanza and Albert Edward Nyanza, western Uganda. I 1–2.

Mongalla—On the east side of the Bahr el Jebel in extreme southern Sudan, a few miles north of Gondokoro. G–H 2.

Mount Gargues—In the Mathews Range, north of Mount Kenia and southeast of Lake Rudolf. Summit said to be 8,800 feet altitude. Also written Mount Uaragess. I 4–5.

Mount Kenia—A high peak in central British East Africa, almost directly on the Equator. Altitude given on recent maps from 17,200 feet to 18,620 feet. Timberline is about 13,000 feet. I–J 4–5.

Mount Kenia Forest Station—A forest station on the west side of Mount Kenia at 7,500 feet altitude. I–J 4–5.

Mount Kilimanjaro—A mountain on the border between British and German East Africa, about 175 miles from the coast. Altitude 19,780 feet. K 4.

Mount Lololokwi—An isolated mountain east of the Mathews Range, about midway between Mount Kenia and Mount Marsabit, British East Africa. I 4–5.

Mount Mbololo—In the Taita Hills, about midway between Kilimanjaro and the coast. Summit 4,400 feet. Sometimes written Mbululu. K 5.

Mount Nyiro—A short distance south of Lake Rudolf and northeast of Lake Sugota. I 4.

Mount Sagalla—In the southern Taita Hills, about midway in a line between Kilimanjaro and Mombasa. K 5.

Mount Uaragess—See Mount Gargues. I 4–5.

Mount Umengo—In the Taita Hills, west of Ndi, and between Taveta and the railway, British East Africa. K 5.

Mtheka Hill—Near the railway station of Ulu, which is 276 miles from Mombasa and about 50 miles from Nairobi. J–K 4.

Mtoto Andei—A station on the railway 165 miles inland from the coast and about midway between Mombasa and Nairobi. Altitude 2,500 feet. K 5.

Mubuku Valley, East Ruwenzori—See Mobuku Valley. I 1–2.

Nairobi—Capital of Ukamba Province, British East Africa, 327 miles from Mombasa and about 260 miles from Port Florence by rail. Altitude 5,450 feet. J 4.

Nairobi River—In this connection one of the headwaters of the Tana River on the southwest side of Mount Kenia. There is a Nairobi River near Nairobi. J 4.

Naivasha—A station on the Uganda railway near Lake Naivasha. Altitude 6,230 feet. J 4.

Naivasha Plains—Northeast of Lake Naivasha. J 4.

Naivasha Station—See Naivasha and Lake Naivasha. J 4.

Nakutichu River—On the Naivasha Plains. J 4.

Ndi—In the Taita Hills, between Taveta and the railroad. K 5.

Neuman's Boma—On the north bank of the Northern Guaso Nyiro River nearly opposite the mouth of the Isiola. Also called Neuman's Camp. Almost directly north from Mount Kenia about 60 miles. I 4–5.

Ngare Nyuki or Nyuki River—One of the headwaters of the Northern Guaso Nyiro, northwest of Mount Kenia. I 4.

N'garri Narok River—See Engare Narok River. J 4.

Nimule—On the east bank of the Bahr el Jebel, about midway between Albert Nyanza and the Sudan border, in northwestern Uganda. H 2.

Njoro Osolali, or Njoro O Solali—In the Sotik, southwestern British East Africa. J 4.

Nkyanuna—A few miles northwest from Fort Kampala, Uganda, on the trail to Hoima. I 2.

North Creek—On the northern slopes of Mount Gargues, Mathews Range, British East Africa. I 4–5.

Northern Guaso Nyiro—The region drained by the Northern Guaso Nyiro River, north of Mount Kenia. I 4–5.

Northern Guaso Nyiro River—Formed by numerous streams in the Aberdares, northern slopes of Mount Kenia, and Mathews Range; and flowing eastward at least to the Lorian Swamp. I 4–5.

North Loroghi—See Loroghi Mountains. I 4.

Nyama Nyango—In the Northern Guaso Nyiro. I 4.

Nyangnori—In the Nandi Hills, a short distance northeast from Port Florence, British East Africa. I–J 3.

Nyeri—On the southwestern side of Mount Kenia at 6,200 feet. J 4.

Nyuki River—See Ngare Nyuki. I 4.

Nzoia River—Drains the Guas Ngishu Plateau and empties into Victoria Nyanza a few miles north of the Equator. I 3.

Ogaden—District in extreme eastern Abyssinia, near British and Italian Somaliland. F–G 8.

Olarakeri—In the Sotik, southwestern British East Africa. J 4.

Oljoro O Nyon River—West side of the Mau Escarpment, about 35 miles southwest of Lake Naivasha. J 4.

Omdurman—In Sudan, on the west bank of the White Nile almost opposite from Khartoum. C–D 2.

Oni—A small stream called also the Omboni River, one of the headwaters of the Tana south of Mount Kenia. J 4–5.

Orr Valley—At Mount Nyiro, near the southern end of Lake Rudolf. I 4.

Quoy, or Quoy Water—On the Marsabit Road northeast from Mount Lololokwi. I 5.

Renk—On the Bahr el Abiad (White Nile) at about 12° north latitude, Sudan. E 3.

Rhino Camp—Colonel Roosevelt's base camp on the west bank of the Nile in extreme southern Lado Enclave at 2° 55′ north. H–I 2.

Rumathe River, or Rumathe Water—A small tributary of the Northern Guaso Nyiro. I 4–5.

Ruwenzori East—Eastern slopes of Mount Ruwenzori. I 2.

Ruwenzori Mountains—In extreme western Uganda just north of Albert Edward Nyanza; rise to an altitude of about 20,000 feet. I 1–2.

Saaita—Seaport of Eritrea, south of Massaua. D 5.

Serengeti Plains—In north central German East Africa south of Loita Plains and west of Lake Natron. The western edge is about 75 miles east of Speke Gulf, Victoria Nyanza. J–K 3–4.

Shambe—On the Bahr el Jebel, Sudan, about midway between Gondokoro and Lake No. G 2.

Shendi—On the Nile, north central Sudan, north of Khartoum. C 3.

Sir Alfred Pease's Farm—See Kitanga. J 4.

Sirgoit—Near the Elgeyo Escarpment, eastern edge of Guas Ngishu Plateau. I 4.

Sirgoit Lake—Near the Elgeyo Escarpment, eastern edge of Guas Ngishu Plateau, northwest from Sirgoit. I 4.

Sotik—District in southwestern British East Africa between the Mau Escarpment and Kavirondo Bay. J 3–4.

Southern Guaso Nyiro—Region of the Southern Guaso Nyiro River, southwestern British East Africa. J 4.

Southern Guaso Nyiro River—Southwestern British East Africa and northern German East Africa on the west side of the Rift Valley. J 4.

Suksukki River—A small stream which connects Lake Zwai with Lake Hora Schalo, south of Adis Ababa, Abyssinia. 7°–8° north; 38°–39° east; altitude 4,500–5,000 feet. F–G 5.

Suswa Plain—South of Lake Naivasha and west of Kikuyu. J 4.

Taita Hills, or Taiti Mountains—About midway between Kilimanjaro and the coast in southeastern British East Africa. K 5.

Tana River—Heads in the Aberdares and southern side of Kenia and flows into the Indian Ocean something over 100 miles north of Mombasa. J 5.

Taveta—In British East Africa near the German East African border southeast of Mount Kilimanjaro. K 4–5.

Telek River—North of Loita Plains in southwestern British East Africa. J 3–4.

Thika River—One of the affluents of the Tana River south of Mount Kenia. J 5.

Ulu—Station on the Uganda Railway 276 miles from Mombasa and about 50 miles southeast from Nairobi; altitude 5,250 feet. J–K 4–5.

Ulukenia Hills—On the Athi Plains east of Nairobi. Also written Ulucania or Lukenia. J 4.

Ulu Station—See Ulu. J–K 4–5.

Uma River—South of Wadelai, Uganda, and north of Albert Nyanza. Also called Ome River. I 2.

Useri River—Fifteen miles east of Kilimanjaro, in British East Africa. K 5.

Voi—Station on the railway 103 miles northwest from Mombasa. Altitude 1,830 feet. K 5.

Wadiola River—A small affluent of the Mbalageti River in northern German East Africa, southwest from Ikoma in the latitude of Speke Gulf. J–K 3.

Wambugu—Between Fort Hall and Mount Kenia at 5,300 feet altitude. J 4–5.

Wami Hill—On the Kapiti Plains, British East Africa. J 4.

Yala River—See Lukosa River. I 3.

Zanzibar—Town on Zanzibar Island. L 5.

Zanzibar Island—Off the coast of German East Africa. L 5.

The arrangement of orders adopted for the list is that of Osborn in his "Age of Mammals." The families and genera are in certain cases shifted about to present a sequence which seems better to show the relationships of certain groups. The generic references are often confined to the citation of the first appearance of the valid name, but frequently include other names and references if pertinent, and in most cases all synonyms based on species included in my list or on very near relatives of such forms. The type-species of each genus is given in parentheses after the original reference, not necessarily in the nomenclature of the original author but under the name now in valid use. The references under each species or subspecies include the original description, with type-locality and location of type-specimen if known, and references to most of the published literature on East African specimens in the National Museum where the authors have used technical names. Any other important references are frequently cited. The plates illustrate the skulls of all type-specimens of mammals of the three orders included in this part which are in the museum. One type-specimen (*Felis leo nyanzæ*) is the skin only and consequently is not figured.

Of the 63 type skulls 60 are here figured for the first time.

A rather large proportion of the specimens in the museum had been provisionally identified by other workers. Much of the material collected by the Smithsonian African Expedition and by the Rainey Expedition had been sorted out and labeled by Mr. Edmund Heller. This preliminary work by others has often been of great help to me, but in many cases, as might be expected, I have been forced to disagree with previous determinations of single specimens or of large series, and am entirely responsible for the determination of every specimen listed in this report. Differences with previous workers in many cases are merely the results of advantages due to the receipt of more material, the benefit of recently published papers, or, in some cases, to a difference of opinion in nomenclature.

Great credit is especially due to Mr. Heller for his success in the field on both of the major expeditions, and his interest in the preliminary arrangement and classification of the collections amassed by himself and his colleagues. His notes on specimens in European museums and the specimens compared by him with the types in those institutions, as well as his exceedingly interesting and valuable journals of the field work, have been of great help in the present work.

Order INSECTIVORA.

Family ERINACEIDÆ.

Genus ERINACEUS Linnæus.

1758. *Erinaceus* LINNÆUS, Syst. Nat., ed. 10, vol. 1, p. 52. (*E. europæus.*)

1848. *Atelerix* POMEL, Archiv. Sci., Phys., Natur., Bibl. Univ. Genève, vol. 9, p. 251. November. (*E. albiventris.*)

1866. *Peroëchinus* FITZINGER, Sitz.-ber. Kais. Acad. Wiss., Wien, vol. 14, pt. 1, p. 565. (*E. pruneri.*)

The only form of the hedgehog included in the collection is the common British East African representative of the four-toed group. Other species, including members of five-toed groups, are known from Somaliland, Abyssinia, and Sudan.

ERINACEUS ALBIVENTRIS HINDEI Thomas.

Plate 6, figs. 1, 2.

1892. *Erinaceus albiventris* TRUE, Proc. U. S. Nat. Mus., vol. 15, p. 469. (Not of Wagner.)

1910. *Erinaceus hindei* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 193. February. (Kitui, British East Africa; type in British Museum.)

1910. *Erinaceus albiventris* ROOSEVELT, African Game Trails, Amer. ed., pp. 474 and 479; London ed., pp. 485 and 491. (Not of Wagner.)

1910. *Erinaceus sotikæ* HELLER, Smithsonian Misc. Coll., vol. 56, No. 15, p. 1. December 23. (Southern Guaso Nyiro River, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Fourteen, from the following localities:

BRITISH EAST AFRICA: Kapiti Plains, 1 (Loring); Loita Plains, 2 (Heller); Mount Lololokwi, 1 (Heller); Southern Guaso Nyiro River, 7 (Loring, Mearns); Taveta, 1 (Abbott); Ulukenia Hills, Athi Plains, 2 (Loring).

The great amount of individual variation in the skull shown in the above series makes it plain that the original diagnoses of the two described forms of the hedgehog from British East Africa have been based mainly on unreliable characters. Among specimens from a single locality are some in which the maxillæ are in contact with the nasal bones for 3.8 millimeters; and others in which the premaxillæ extend backward and touch or lap the tips of the processes of the frontals, entirely cutting off the maxillæ from the nasals. In two skulls these differences obtain on opposite sides of the same specimen. Length and breadth of nasal bones are also so variable as to appear valueless as characters of subspecific distinction.

Additional specimens from the Sotik, collected since the original publication of *Erinaceus sotikæ,* show such wide variation from the type as to make it impossible to recognize a second race. Several specimens from the two general regions are virtually indistinguishable and there appear to be no average characters outside the range of individual variation represented. The color of the feet seems to be a question of age. The younger specimens all have the feet quite blackish, while adults exhibit a tendency toward pale brown or even whitish feet, according to the age of the individual as indicated by wear of the teeth. Much additional material from numerous localities and a careful revision will be necessary before the true relationships of the named forms of this group of hedgehogs will be known. Names which require consideration in such a revision are *Erinaceus pruneri* Wagner[1] (Nile Valley) and *Erinaceus albiventris atratus* Rhoads[2] (Ngare Nocbor, Lake Rudolf).

A female hedgehog collected by Heller on the Loita Plains May 28 contained four embryos. Mearns records the color of the irides

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[1] Schreber, Suppl., vol. 2, p. 23, 1841.

[2] Proc. Acad. Nat. Sci. Philadelphia, 1896, p. 544.

Measurements of specimens of Erinaceus albiventris hindei from British East Africa.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Ear from crown.	Skull: Condylobasal length.	Zygomatic breadth	Mastoid breadth	Postorbital constriction.	Breadth of rostrum at premaxillary suture.	Greatest length nasals.	Mandible.	Maxillary tooth row, entire (alveoli).	Mandibular tooth row, entire (alveoli).	Condition of teeth.
Mount Lololokwi	182652	Male	172	25	25	26	42.9	27.2	18.9	11.2	8.3	11.8	32.5	20.3	15.4	Much worn.
Ulukenia Hills	164022	do	198	38	30	24	41.0	26.7	21.8	11.4	8.2	13.3	32.2	20.3	17.0	Do.
Do.	164023	do	184	33	29	22	41.5	25.4	20.1	11.1	8.3	11.6	31.8	20.8	17.4	Do.
Kapiti Plains	161699	do	194	....	29	....	42.4	27.6	21.5	11.2	8.3	14.2	31.6	20.6	16.8	Do.
S. Guaso Nyiro River	[1] 162112	do	170	26	31	....	42.1	26.7	20.8	11.0	9.5	15.8	32.4	21.4	17.6	Moderately worn.
Do.	162113	do	172	28	27	....	38.5	24.4	19.3	11.0	8.2	14.2	29.3	19.2	16.7	Little worn.
Do.	162116	do	195	23	31	21	41.0	....	20.8	11.1	8.3	14.2	31.3	20.5	16.8	Moderately worn.
Loita Plains	181442	Female	205	20	26	26	40.2	26.7	21.0	11.3	8.5	12.2	31.6	19.8	17.0	Considerably worn.

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[1] Type of *Erinaceus sotikæ*.

as dark brown. All the collectors note finding numbers of the spiny skins of the back, the fleshy parts of the animals having been eaten by some carnivorous bird or beast.

For measurements of specimens see page 27

Family MACROSCELIDÆ.

Genus RHYNCHOCYON Peters.

1847. *Rhynchocyon* Peters, Mon.-ber. K. Preuss. Akad. Wiss., Berlin, p. 36. (*R. cirnei*.)

No specimens of these large and richly colored elephant-shrews were obtained by the Smithsonian African Expedition. The single specimen in the museum was collected in the coast region near Mombasa by the Rainey Expedition in 1911. The animals are evidently difficult to secure, or are much restricted in their distribution.

RHYNCHOCYON PETERSI PETERSI Bocage.

1880. *Rhynchocyon petersi* Bocage, Journ. Sci., Math., Phys. Nat., Acad. Sci. Nat. Lisboa, vol. 7, p. 159. (Mainland of East Africa, region of Zanzibar; type in Museu Bocage, Lisbon.)

1900. *Rhynchocyon petersi usambarae* Neumann, Zool. Jahrb., Syst., vol. 13, p. 542. (Usambara Mts., German East Africa; type in Berlin Museum.)

1912. *Rhynchocyon petersi* Dollman, Ann. and Mag. Nat. Hist., ser. 8, vol. 10, pp. 130, 131. July. (Fixes type-locality.)

Specimen.—One skin and skull, with the skinned body in alcohol, from:

British East Africa: Mazeras (Heller).

This specimen, an adult nursing female, measures: Head and body, 275 millimeters; tail vertebræ, 240; hind foot, 67; ear, 29. Skull: Greatest length, 66.7; condylobasal length, 61.9; zygomatic breadth, 35.1; least interorbital breadth, 21.2; least breadth of rostrum, 12.8; length of mandible, 51.7. Teeth: Entire upper row, 30; upper molariform series, 17; entire lower row, 33.2.

Genus CERCOCTENUS Hollister.

1916. *Cercoctenus* Hollister, Smithsonian Misc. Coll., vol. 66, No. 1, p. 1. February 10. (*C. sultan*.)

These giant jumping shrews apparently are confined in British East Africa to the region of the coast, inland to the Taita Hills. Like *Rhynchocyon* they are represented in our collection only by the specimens collected by the Rainey Expedition in that district.

CERCOCTENUS SULTAN SULTAN (Thomas).

1897. *P[etrodromus] sultani* Thomas, Proc. Zool. Soc. London, p. 435. (Mombasa, British East Africa; type in British Museum.)

1897. *P[etrodromus] sultan* Thomas, Proc. Zool. Soc. London, p. 928. (Correction of misprint.)

1916. *Cercoctenus sultan* Hollister, Smithsonian Misc. Coll., vol. 66, No. 1, p. 2, February 10.

Specimens.—Forty, including six in alcohol, from:

British East Africa: Mazeras (Heller).

Three females contained one large fetus each, on December 21 and 24. Two of these fetuses are preserved in alcohol. The label of one adult specimen records the stomach contents as termites. As stated by Heller,[1] this excellent series proves conclusively the great sexual difference in color in this species. The females are much more richly colored than the males and have the entire underparts washed, often quite heavily, with ochraceous-buff; the sides of the body, hips, and the outer side of legs are also richly colored with deep ochraceous. In the series of males, all the specimens have the underparts much paler, whitish or creamy-buff, and the sides and legs are decidedly grayer. Heller further states:

> This large insectivore is known to the Duruma tribe as sangi. They are an article of diet with these negroes who catch them in snares set along their runways in the forests.

This large elephant shrew has the same diurnal habits as *Elephantulus*, for Heller saw one running along its trail at five o'clock in the afternoon in the bright sunshine.

CERCOCTENUS SULTAN SANGI (Heller).

Plate 6, figs. 6, 7.

1912. *Petrodromus sultani sangi* Heller, Smithsonian Misc. Coll., vol. 60, No 12, p. 12. November 4. (Mt. Mbololo, British East Africa; type in U. S. Nat. Mus.)

1916. *Cercoctenus sultan sangi* Hollister, Smithsonian Misc. Coll., vol. 66, No. 1, p. 2. February 10.

Specimen.—One, the type, from:

British East Africa: Mount Mbololo, Taita Hills, at 4,000 feet altitude (Heller).

I can not distinguish this specimen by color from the Mazeras series of males of *C. s. sultan.* The skull is chiefly distinguished by its narrow rostrum; and the upper premolars are noticeably smaller than in any male of the Mazeras series.

For measurements of specimens of *Cercoctenus* see table, page 30.

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[1] Smithsonian Misc. Coll., vol. 60, No. 12, p. 13. November 4, 1912.

Measurements of Specimens of Cercoctenus sultan.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Ear.	Skull: Condylobasal length.	Zygomatic breadth	Interorbital breadth	Median length nasals.	Mandible.	Upper tooth row (entire).	Upper molariform teeth.	Lower tooth row (entire).	Condition of teeth.
C. s. sultan.															
B. E. A.: Mazeras	182617	Male	190	161	56	34	54.2	29.4	8.4	21.1	44.4	29.0	13.8	27.8	Moderately worn.
Do	182619	...do	120	158	54	36	53.5	29.7	8.2	19.8	43.6	29.0	12.5	26.7	Much worn.
Do	182620	...do	195	169	57	35	52.4	28.9	8.3	20.2	42.3	29.9	14.3	27.3	Unworn.
Do	182621	...do	195	174	57	34	54.4	30.5	8.4	19.8	43.9	29.8	13.3	27.9	Moderately worn.
Do	182624	...do	190	150	55	35	55.2	30.8	8.8	21.0	44.7	30.2	13.3	27.3	Do.
Do	182625	...do	200	171	55	35	52.2	29.0	8.2	20.5	42.3	29.1	13.2	26.2	Do.
Do	182627	...do	195	162	55	35	53.2	30.5	8.8	19.8	43.4	28.9	13.0	26.7	Do.
Do	182629	do	200	163	57	36	53.8	28.7	8.3	20.9	42.9	30.7	13.9	28.2	Do.
Do	182637	...do	190	165	56	33	51.9	28.8	8.4	19.5	41.7	28.8	13.3	26.8	Little worn.
Do	182638	do	190	150	53	34	51.5	....	8.1	18.5	41.4	28.0	12.8	25.9	Moderately worn.
Do	182643	...do	190	152	52	34	52.8	30.4	8.5	19.6	43.5	28.7	12.9	26.5	Much worn.
Do	182645	...do	210	164	57	35	....	29.0	8.8	20.9	44.2	29.6	13.1	27.3	Do.
Do	182646	...do	200	165	57	36	55.6	30.6	8.6	20.9	45.7	30.8	13.4	28.5	Do.
Do	182647	...do	195	155	54	34	53.0	30.8	8.6	20.4	43.6	29.2	12.7	27.0	Moderately worn.
Do	182649	...do	200	163	54	35	55.2	29.9	8.3	19.9	44.3	30.0	13.9	27.6	Much worn.
Do	182618	Female	190	164	55	33	52.4	29.7	8.8	18.3	42.4	29.0	13.1	26.0	Do.
Do	182623	...do	200	162	55	36	54.1	30.1	8.5	20.3	43.6	29.6	13.2	27.3	Do.
Do	182626	...do	200	160	54	34	52.2	29.3	8.0	20.4	41.8	28.9	13.0	26.8	Moderately worn.
Do	182628	...do	210	168	57	34	54.9	30.3	8.6	20.0	44.4	30.3	13.4	27.3	Much worn.
Do	182630	...do	190	166	54	34	51.7	28.4	8.0	18.6	41.5	29.5	13.8	27.2	Little worn.
Do	182631	...do	175	166	55	34	50.0	26.6	8.2	18.2	40.3	....	....	27.3	m^3 not in place.
Do	182633	...do	200	174	57	35	54.6	30.4	8.4	20.2	43.5	29.4	13.3	27.1	Much worn.
Do	182636	...do	190	170	55	34	52.6	28.7	7.8	19.7	42.8	29.7	13.4	27.7	Moderately worn.
Do	182640	...do	220	164	56	36	54.8	29.9	8.5	19.9	44.0	29.8	13.2	27.3	Much worn.
Do	182641	...do	200	172	56	35	....	28.0	7.7	19.7	40.6	28.6	13.8	27.1	Unworn.
C. s. sangi.															
B. E. A.: Mt. Mbololo	[1]181822	Male	190	....	56	34	52.2	29.1	8.1	20.4	41.7	28.6	13.2	26.8	Moderately worn.

[1] Type.

Genus NASILIO Thomas and Schwann.

1906. *Nasilio* Thomas and Schwann, Abstr. Proc. Zool. Soc. London, No. 33, p. 10. June. (*N. brachyrhynchus.*)

The lesser jumping shrews are widely distributed in East Africa, and specimens were collected by members of the Smithsonian African Expedition in many localities. The genus is known to occur in Uganda, but no specimens from that region are in the collection.

NASILIO BRACHYRHYNCHUS DELAMEREI (Thomas).

1901. *Marcroscelides delamerei* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 8, p. 155, August. (Athi River, British East Africa; type in British Museum.)

1910. *Nasilio brachyrhynchus delamerei* Roosevelt, African Game Trails, Amer. ed., p. 474; London ed., p. 485.

Specimens.—Twenty-seven, from the following localities:

British East Africa: Engare Narok River, 1 (Loring); Kapiti Plains, 1 in alcohol (Loring); Loita Plains, 1 (Heller); Southern Guaso Nyiro, 13, including 3 in alcohol (Loring, Heller); Ulukenia Hills, 11, including 4 in alcohol (Loring).

Loring records females from Ulukenia Hills pregnant as follows: November 26, two with two embryos each; November 27, one with one embryo; and from the Southern Guaso Nyiro, two large fetuses each in females taken June 21 and 30. The specimens from Southern Guaso Nyiro and Loita Plains seem to be identical in color with the skins from Ulukenia Hills.

NASILIO BRACHYRHYNCHUS ALBIVENTER Osgood.

1910. *Nasilio brachyrhynchus albiventer* Osgood, Field Mus., Zool. Ser., vol. 10, No. 2, p. 13. February. (Lake Elmenteita, British East Africa; type in Field Mus. Nat. Hist.)

Specimens.—Six, from localities as follows:

British East Africa: Bargunett River, Meru Road, 1 (Heller); Engare Ndare River, 1 (Clark); Lesiweru River, Meru Road, 1 (Heller); Naivasha Station, 2 (Loring); Nyuki River, 1 in alcohol (Heller.)

This is a slight color subspecies, apparently recognizable from *delamerei* only by the average darker tones of the upperparts. The Naivasha Lake skins, while nearest to *albiventer*, are clearly intermediate toward *delamerei*. Young examples of both subspecies are usually considerably darker and richer colored than fully adult animals.

For measurements of specimens of *Nasilio* see table, page 32.

Measurements of Specimens of Nasilio from British East Africa.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: Condylobasal length.	Zygomatic breadth.	Length of nasals.	Interorbital breadth.	Mandible.	Upper tooth row, entire.	Condition of teeth.
N. b. delamerei.												
Ulukenia Hills	164009	Male	120	106	27	30.5	18.7	11.3	5.9	24.2	16.9	Moderately worn.
Do	164010	...do	124	110	27	31.7	18.5	11.5	5.9	25.5	17.2	Do.
Do	164011	...do	138	113	29	31.9	18.8	12.3	5.7	25.8	17.2	Much worn.
Do	164013	...do	123	120	29	32.4	19.1	12.8	5.8	25.9	17.3	Do.
Do	164014	...do	125	122	28	31.3	18.0	12.6	5.4	25.3	17.7	Moderately worn.
Do	164012	Female	116	112	28	30.8	17.6	12.2	5.5	24.7	17.3	Unworn.
Southern Guaso Nyiro	162059	Male	119	105	27	30.8	18.0	12.6	5.6	25.0	17.6	Little worn.
Do	162061	...do				32.2	18.2	12.8	5.7	25.3	17.4	Do.
Do	162062	...do	115	100	27	32.7		12.6	5.9	24.6	17.2	Do.
Do	162063	...do	108	108	28	31.0		12.7		24.8	17.2	Moderately worn.
Do	162064	...do	112		28	31.9	18.5	12.6	5.8	25.4	17.7	Do.
Loita Plains	181461	...do	120	115	27	31.5	18.9	12.6	6.0	25.2	17.0	Do.
N. b. albiventer.												
Lesiworu River	182615	...do	120	108	29	32.7	18.3	12.7	5.9	26.3	18.5	Very little worn.
Engare Ndare River	182616	...do	112	108	29							
Nyuki River	165611	Female				31.9	18.0	12.7	6.2	25.4	18.0	Little worn.
Naivasha Station	162069	Male	123	111	29	32.2	19.0	12.8	6.1	26.1	17.5	Much worn.

Genus ELEPHANTULUS Thomas and Schwann.

1906. *Elephantulus* Thomas and Schwann, Abstr. Proc. Zool. Soc. London, No. 33, p. 10. June. (*E. rupestris*.)

In the treatment of the forms of the jumping shrews of the genus *Elephantulus* from British East Africa I have followed Heller's disposition of them as races of *rufescens*,[1] although our collection alone does not in any case show actual intergradation between the various named forms.

For measurements of specimens of this genus, see pages 34–35.

ELEPHANTULUS RUFESCENS RUFESCENS (Peters).

1878. *Macroscelides rufescens* Peters, Mon.-ber. K. Preuss. Akad. Wiss. Berlin, p. 198. March. (Ndi, Taita Hills, British East Africa; type in Berlin Museum?)

Specimens.—Seven, from the following localities:

British East Africa: Mtoto Andei, 3 (Heller); Voi, 4 (Heller).

Heller records on the label of one skin from Mtoto Andei that the animal was shot on a roadway at 8 o'clock in the morning. In his journal he tells of seeing several jumping shrews running about in the bright sunshine. A female from the same place, April 3, was pregnant with one large fetus.

ELEPHANTULUS RUFESCENS MARIAKANÆ Heller.

Plate 6, fig. 3.

1912. *Elephantulus rufescens mariakanæ* Heller, Smithsonian Misc. Coll., vol. 60, No. 12, p. 10. November 4. (Mariakani, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Five, from—

British East Africa: Mariakani (Heller).

This is a much less reddish form than true *rufescens* and is somewhat intermediate in color between that form and *phæus* of the more interior regions. It is a coast subspecies and its range is separated from that of *phæus* by the desert country inhabited by *rufescens*.

ELEPHANTULUS RUFESCENS PHÆUS Heller.

Plate 6, figs. 4, 5.

1910. *Elephantulus pulcher* Roosevelt, African Game Trails, Amer. ed., pp. 474, 479, and 487; London ed., pp. 485, 491, and 498. (Not of Thomas.)

1910. *Elephantulus phæus* Heller, Smithsonian Misc. Coll., vol. 56, No. 15, p. 8. December 23. (Njoro O Solali, Sotik District, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Twenty-six, from localities as follows:

British East Africa: Kabalolot Hill, Sotik, 6 (Heller); Lime Springs, Sotik, 3 (Heller); Loita Plains, 1 (Heller); Njoro O Solali,

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[1] Smithsonian Misc. Coll., vol. 60, No. 12, p. 11. Nov. 4, 1912.

Measurements of Specimens of Elephantulus from British East Africa.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: Condylobasal length.	Zygomatic breadth	Length of nasals.	Interorbital breadth	Mandible.	Upper tooth row, entire.	Condition of teeth.
E. r. rufescens.												
Voi	182611	Male	120	101	30	33.6	19.4	13.2	5.6	26.4	17.7	Moderately worn.
Do.	182612	...do...	120	108	29	31.4	18.9	12.5	5.7	24.6	16.8	Do.
Do.	182613	...do...	120	118	30	....	....	11.8	5.9	25.3	16.8	Much worn.
Mtoto Andei	181443	...do...	120	103	30	....	17.9	11.7	5.9	....	17.1	Little worn.
Do.	181444	...do...	120	106	30	31.9	19.0	11.8	5.8	25.0	16.7	Moderately worn.
Do.	181446	Female	121	114	30	31.3	18.5	11.6	5.5	24.3	16.3	Little worn.
E. r. mariakanæ.												
Mariakani	182607	Male	132	123	31	....	....	12.2	....	25.7	17.4	Moderately worn.
Do.	[1] 181821	Female	130	108	30	32.8	19.3	12.3	6.1	25.9	17.3	Do.
E. r. phæus.												
So. Guaso Nyiro	162072	Male	132	122	32	34.4	20.4	12.9	6.1	26.4	17.6	Much worn.
Do.	162073	...do...	121	127	32	32.9	19.8	12.7	5.9	25.5	17.3	Moderately worn.
Njoro O Solali	[1] 162074	...do...	133	133	33	34.1	19.8	13.3	5.8	26.6	17.4	Do.
Do.	162075	...do...	128	132	32	33.8	20.3	13.3	5.8	26.2	17.3	Do.
Kabalolot Hill	181452	...do...	130	....	32	....	19.7	11.8	5.9	24.8	17.1	Do.
Do.	181453	...do...	135	....	32	33.8	20.1	12.9	6.1	26.2	17.7	Do.
Do.	181455	...do...	108	116	33	33.7	....	13.2	6.2	27.0	17.4	Much worn.
Do.	181451	Female	150	125	32	34.2	20.5	12.3	5.9	27.1	17.7	Do.
Do.	181454	...do...	136	123	33	33.1	20.1	12.7	6.1	26.2	17.0	Do.
Telek River	181459	Male	130	118	32	33.2	20.0	12.1	6.0	26.2	17.4	Do.
Do.	181457	Female	130	120	32	32.8	20.1	12.1	5.8	26.3	17.1	Do.
Do.	181458	...do...	140	129	33	33.4	19.7	12.4	5.7	26.4	17.8	Little worn.
Do.	181460	...do...	140	129	33	34.3	20.5	13.1	6.1	27.3	17.8	Moderately worn.
Loita Plains	181450	...do...	135	105	31	33.3	19.9	12.2	6.0	25.7	17.5	Do.

E. r. dundasi.												
North Loroghi	182603	Male	126	135	33	....	....	....	....	....	....	
Nyama Nyango	182601	...do	128	135	33	....	....	....	....	....	....	
Do	182602	Female	129	125	32	....	....	....	....	....	....	
E. r. boranus.												
Nor. Guaso Nyiro	[2] 165605	Male	....	123	31	33.7	19.1	12.3	5.6	25.5	17.4	Moderately worn.
E. r. delicatus.												
Mt. Nyiro	182600	....	127	148	33	....	....	....	....	....	....	

[1] Type.

[2] Preserved in alcohol.

Sotik, 3 (Loring); Southern Guaso Nyiro, 8, including 5 in alcohol (Heller, Loring); Telek River, Sotik, 5 (Heller).

Heller records, on the labels of specimens, one embryo each in females collected as follows: Kabalolọt Hill, April 30, May 4; Loita Plains, April 27; and Telek River, May 20.

This is the darkest race of *Elephantulus* represented in our collections from East Africa.

Roosevelt and Heller speak of this jumping shrew as follows:[1]

> Fairly common throughout British East Africa in bush and on hills, not in deep forests or on bare plains. Often out at dusk, but generally nocturnal. A gravid female contained a single embryo. One in a trap had its mouth full of partly masticated brown ants. A gentle thing, without the fierceness of the true shrews. Trapped in runways of *Arvicanthis*.

Loring, in Appendix C of Roosevelt's African Game Trails, has the following notes on this form:

> Both diurnal and nocturnal. While riding over the country I frequently saw them darting through the runways from one thicket to another. Nearly every clump of bushes and patch of rank vegetation in the Sotik and Naivasha districts was traversed with well-worn trails, used by different species of *Mus* and shrews. The elephant shrews were most common on the dry flats, where clumps of fiber plants grew, and their trails usually led into some thorny thicket and finally entered the ground.

ELEPHANTULUS RUFESCENS DUNDASI Dollman.

1910. *Elephantulus dundasi* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 95. January. (Harich, near Lake Baringo, British East Africa; type in British Mus.)

1912. [*Elephantulus rufescens*] *dundasi* HELLER, Smithsonian Misc. Coll., vol. 60, No. 12, p. 11. November 4.

Specimens.—Three, from localities as follows:

BRITISH EAST AFRICA: North Loroghi, 1 (Percival); Nyama Nyango, Northern Guaso Nyiro, 2 (Percival).

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[1] Roosevelt, African Game Trails, Amer. ed., p. 479; London ed., p. 491. 1910.

This form is decidedly nearest in general coloration to *Elephantulus rufescens mariakanæ* Heller, of the coast district of southeastern British East Africa. It has a longer, fuller pelage than *mariakanæ*, and is slightly more rufous, less grayish or wood brown in color.

ELEPHANTULUS RUFESCENS BORANUS (Thomas).

1901. *Macroscelides boranus* THOMAS, Proc. Zool. Soc. London, 1900, p. 802. April. (Mega, Western Boran Galla, southeast of Lake Rudolf, British East Africa; type in British Museum.)

1910. *E[lephantulus] boranus* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 96. January.

1912. *[Elephantulus rufescens] boranus* HELLER, Smithsonian Misc. Coll., vol. 60, No. 12, p. 11. November 4.

Specimen.—One, in alcohol, from—

BRITISH EAST AFRICA: Northern Guaso Nyiro River (Heller).

This single specimen represents a form not otherwise included in the collection. It agrees well with the description of *boranus* and differs from the skins of *dundasi* and *delicatus* by its darker color above and below, and is further distinguished from *delicatus* by its broadly dark slate underfur on the breast and belly.

ELEPHANTULUS RUFESCENS RENDILIS Lönnberg.

1912. *Elephantulus pulcher rendilis* LÖNNBERG, Kungl. Svenska Vet. Handl., vol. 48, No. 5, p. 49. (Thera and below Chanler Falls, north of Guaso Nyiro, British East Africa; type in R. Nat. Mus., Stockholm.)

Specimen.—One, from—

BRITISH EAST AFRICA: Longaya Water, Marsabit Road (Heller).

Although immature, this specimen is clearly of a form different from *boranus* and perhaps closely allied to *delicatus*. The hairs of the middle underparts are white to the bases, and the general color above somewhat approaches that of certain specimens of true *rufescens*. The specimen is, without doubt, the young of *rendilis*, but whether that form is really distinguishable from *delicatus* or not, our material is not sufficient to prove.

In his notes written at Longaya, Heller mentions seeing two elephant shrews running about the rocks at ten o'clock in the forenoon, in the hot sun.

ELEPHANTULUS RUFESCENS DELICATUS Dollman.

1911. *Elephantulus delicatus* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 8, p. 652. November. (Orr Valley, Mount Nyiro, British East Africa; type in British Museum.)

Specimen.—One, from—

BRITISH EAST AFRICA: Orr Valley, Mount Nyiro (Percival).

Family SORICIDÆ.

Genus SURDISOREX Thomas.

1906. *Surdisorex* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 18, p. 223. September. (*S. noræ.*)

Two closely related species of short-tailed shrews are included in the collections. All the specimens are from high altitudes, none having been taken below 9,000 feet.

For measurements of the specimens see table, page 38.

SURDISOREX NORÆ Thomas.

1906. *Surdisorex noræ* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 18, p. 223. September. (East side of Aberdare Range, near Nyeri, British East Africa; type in British Museum.)

1910. *Surdisorex noræ* Roosevelt, African Game Trails, Amer. ed., pp. 474 and 480; London ed., pp. 486 and 491.

Specimens.—Nine (three in alcohol), from—

British East Africa: Aberdare Mountains, 10,000 to 11,000 feet (Heller).

Only one skull, out of the nine specimens of this shrew in the collection, shows the small second lower unicuspid tooth described by Thomas in the type. In this specimen the extra tooth is well developed on both sides and can be plainly seen without the aid of a glass. A single female, preserved in alcohol, August 10, shows 3–3 inguinal mammæ. Heller records two embryos in a female collected October 12. His notes state that the species is diurnal.

SURDISOREX POLULUS Hollister.

Plate 7, figs. 1, 2.

1910. *Surdisorex noræ* Roosevelt, African Game Trails, Amer. ed., p. 487; London ed., p. 498. (Not of Thomas.)

1916. *Surdisorex polulus* Hollister, Smithsonian Misc. Coll., vol. 66, No. 1, p. 1. February 10. (Mount Kenia, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Thirty-five (four in alcohol), from—

British East Africa: West side of Mount Kenia, 9,000 to 12,000 feet (Loring, Mearns).

Out of this large series only a single skull shows the extra lower unicuspid, and this one on one jaw only. The specimens were all collected between September 22 and October 8. There are some in complete new coat and others in which the change has barely commenced. The numerous moulting skins show the process of renewal to be rather evenly accomplished, from the head backward, in a definite line. Loring records a female, October 4, with one embryo

Measurements of specimens of Surdisorex from British East Africa.

Species, locality, and No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Skull: Condylobasal length.	Zygomatic breadth	Breadth of brain case.	Mandible.	Upper tooth row, entire.	Lower tooth row, entire.	Condition of teeth.
S. noræ.											
Aberdare Mountains:											
165513	Male	......	......	16.0	......	......	......	14.5	11.0	10.1	Little worn.
165515	do	......	......	16.4	......	......	......	14.8	11.1	10.1	Moderately worn.
182582	do	100	33	15.5	25.2	7.3	......	14.4	11.4	10.2	Do.
182583	do	100	33	15.5	25.3	7.2	13.4	14.5	11.1	10.2	Do.
165514	Female	......	......	15.5	......	7.4	......	14.8	11.0	10.3	Do.
182584	do	102	32	15.0	25.1	7.2	......	14.4	10.8	9.7	Much worn.
182586	do	96	34	16.0	......	7.2	......	14.8	11.4	10.3	Moderately worn.
S. polulus.											
Mount Kenia:											
163978	Male	96	31	16.0	24.5	6.8	12.3	14.1	10.8	9.8	Moderately worn.
163983	do	95	28	18	24.4	7.0	12.7	14.0	10.4	9.5	Do.
163984	do	91	31	16	24.4	7.0	12.7	14.2	10.5	9.5	Considerably worn.
163986	do	94	26	17	23.7	6.9	12.7	13.9	10.8	9.6	Moderately worn.
163992[1]	do	92	30	17	24.5	6.8	12.5	14.4	10.6	9.6	Do.
163993	do	95	27	16	24.2	6.8	12.4	14.2	10.4	9.7	Do.
163980	Female	100	29	18	24.2	6.9	12.7	14.3	10.1	9.3	Considerably worn.
163981	do	97	29	17	24.2	6.8	12.7	14.2	10.3	9.5	Do.
163987	do	89	29	17	24.3	6.8	12.6	14.3	10.5	9.6	Moderately worn.
163994	do	96	24	16	23.7	6.6	12.5	14.2	10.2	9.3	Considerably worn.
163997	do	98	30	17	24.2	7.1	13.2	14.4	10.4	9.6	Moderately worn.
164000	do	93	29	16	23.8	6.5	12.5	13.7	10.7	9.7	Do.
164003	do	100	31	17	23.9	6.8	12.5	13.5	10.4	9.4	Do.
164004	do	94	27	16	24.5	7.0	12.9	14.1	10.3	9.5	Considerably worn.

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[1] Type.

5 millimeters long; and one, October 2, with two embryos 18 millimeters in length.

With the exception of those collected at 10,000 feet, where they were trapped in open grassy and brushy parks in the bamboo, most of them were taken in runways of *Otomys*, and all of those taken at 12,100 were caught in such runways in tall marsh grass.[1]

Genus SYLVISOREX Thomas.

1904. *Sylvisorex* THOMAS, Abstr. Proc. Zool. Soc. London, No. 10, p. 12. November 22. (*S. morio.*)

Two distinct groups of forest shrews are known from Equatorial East Africa. Species of each group are included in the collections. They are readily distinguished by length of tail.

For measurements see table, page 40.

SYLVISOREX GEMMEUS Heller.

Plate 7, figs. 5, 6.

1910. *Sylvisorex gemmeus* HELLER, Smithsonian Misc. Coll., vol. 56, No. 15, p. 7. December 23. (Rhino Camp, Lado Enclave; type in U. S. Nat. Mus.)

Specimens.—Thirty-seven, from the following localities:

LADO: Rhino Camp, 2 (Loring).

BRITISH EAST AFRICA: Kaimosi, 35, including 19 in alcohol (Heller, Turner).

The two specimens from Lado Enclave can be matched in every particular by skins and skulls in the series from Kaimosi. This form will eventually, without much doubt, prove to intergrade with *Sylvisorex sorella* Thomas, of Nyasaland. The form described by Doctor Lönnberg from the Isiola River, Northern Guaso Nyiro, as *Sylvisorex sorelloides*,[2] appears from the description to be very closely related. Thomas has named a subspecies from southern Uganda, *Sylvisorex gemmeus irene*[3] based on a slight color difference.

SYLVISOREX MUNDUS Osgood.

1910. *Sylvisorex mundus* OSGOOD, Field Mus., Zool. Ser., vol. 10, No. 3, p. 18. April 7. (Kijabe, British East Africa; type in Field Mus. Nat. Hist.)

Specimens.—Five, including 3 in alcohol, from—

BRITISH EAST AFRICA: West side of Mount Kenia, 7,000, 8,500, and 10,000 feet (Loring, Heller, Mearns).

The two skins are slightly browner, less blackish-brown, than the type-specimen, which is in fresh pelage, but are otherwise virtually indistinguishable.

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[1] African Game Trails, Amer. ed., p. 487. 1910.

[2] Ann. and Mag. Nat. Hist., ser. 8, vol. 9, p. 67. January, 1912.

[3] Ann. and Mag. Nat. Hist., ser. 8, vol. 16, p. 151. August, 1915.

Measurements of specimens of Sylvisorex.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: condylobasal length.	Maxillary breadth	Breadth of brain-case.	Depth of brain-case (median).	Mandible.	Upper tooth row (entire).	Condition of teeth.
S. gemmeus.												
Lado: Rhino Camp	[1] 164644	Male	69	72	15.0	17.5	5.4	7.9	4.8	8.5	7.4	Little worn.
Do.	164861	...do	67	72	14.0	17.3	5.3	7.7	4.8	8.6	7.7	Do.
B. E. A.: Kaimosi	182589	...do	65	82	14.2	17.2	5.5	7.7	4.8	8.8	7.4	Moderately worn.
Do.	182590	...do	68	81	14.5	17.6	5.5	7.9	4.8	9.3	7.8	Do.
Do.	182591	...do	63	86	14.5	....	5.5	....	....	9.0	7.8	Do.
Do.	182595	...do	67	76	14.2	16.8	5.4	....	....	8.3	7.1	Do.
Do.	182594	...do	65	73	13.5	16.5	5.4	7.7	4.5	8.8	....	Do.
Do.	182596	...do	70	82	14.5	17.4	5.6	8.0	5.0	9.1	7.5	Do.
Do.	182597	...do	68	84	14.0	17.2	5.5	8.2	4.8	8.8	7.7	Do.
Do.	182598	...do	67	81	14.3	17.4	5.4	7.7	4.6	9.0	7.7	Little worn.
Do.	182599	...do	67	77	14.4	17.8	5.5	8.2	4.8	8.8	7.5	Moderately worn.
Do.	197963	...do	64	81	14.5	17.3	5.9	8.1	5.1	9.3	7.6	Do.
Do.	182587	Female	65	76	13.6	....	5.3	....	....	8.8	7.5	Do.
Do.	182588	...do	60	73	13.3	....	5.2	....	....	8.4	....	Do.
Do.	182592	...do	67	82	14.0	17.4	5.7	8.0	5.0	9.0	7.5	Considerably worn.
Do.	182593	...do	60	78	13.7	17.0	5.4	7.7	4.5	8.8	7.4	Do.
Do.	197961	...do	68	72	13.5	....	5.5	8.0	4.7	8.9	7.3	Moderately worn.
Do.	197962	...do	62	78	14.2	17.0	5.4	7.9	4.6	8.9	7.4	Do.
S. mundus.												
B. E. A.: Kijabe	[2] 16801	Male	70	59	12.0	16.4	5.2	8.3	5.1	8.5	7.2	Little worn.
B. E. A.: Mount Kenia	164141	...do	70	58	12.6	....	5.2	8.0	....	8.5	7.2	Moderately worn.
Do.	164142	...do	69	58	12.0	16.6	5.3	....	....	8.7	7.3	Little worn.

[1] Type.

[2] Field Mus. Nat. History; type.

Genus PACHYURA Sélys-Longchamps.

1839. *Pachyura* Sélys-Longchamps, Études de Micromamm., p. 32. (*P. etrusca.*)

The tiny equatorial African representatives of the 30-toothed musk shrews appear to be very rare or exceedingly difficult to capture. On the Rainey Expedition a single specimen was collected.

PACHYURA LIXA ÆQUATORIA Heller.

Plate 7, figs. 7, 8.

1912. *Pachyura lixa æquatoria* Heller, Smithsonian Misc. Coll., vol. 60, No. 12, p. 4. November 4. (Mt. Sagalla, Taita Hills, British East Africa; type in U. S. Nat. Mus.)

Specimen.—One, the type, from—

British East Africa: Mount Sagalla (Heller).

Genus CROCIDURA Wagler.

1832. *Crocidura* Wagler, Isis, p. 275. (*C. leucodon.*)

1910. *Heliosorex* Heller, Smithsonian Misc. Coll., vol. 50, No. 15, p. 6, pl. 1. December 23. (*C. roosevelti.*)

The African musk shrews of this genus have recently been monographed by Mr. Guy Dollman.[1] Unfortunately this monograph is based almost entirely on material in the British Museum, and no attempt seems to have been made by the author to gather information about the type-specimens preserved in the American museums beyond that contained in the original description. A number of species described by American mammalogists, therefore, appear in the wrong groups in Dollman's paper, and while the information made available regarding the British Museum material is of the utmost importance and of great value to workers in this most difficult group, the paper is apt to be very misleading to one who has a small collection to work up without much material for comparison. It is furthermore very evident that the species groups in *Crocidura* are not yet carefully worked out and, as recognized, are not in any sense circumscribed sections of the genus.

The first installment of Dollman's paper appeared just as I had finished working over the specimens listed in the present report. Since the completion of his synopsis I have gone over carefully for a second time all of our material and have attempted, so far as I found it possible, to arrange the groups and species in the sequence adopted by him. Through the kindness of the Field Museum of Natural History, Chicago, I have had before me during this work the six type-specimens of East African species of *Crocidura* from that institution; and the American Museum of Natural History of New York has lent me the one East African type in its possession. The United

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[1] On the African shrews belonging to the Genus *Crocidura*, Ann. and Mag. Nat. Hist., ser. 8, vol. 15, pp. 508-527, May; pp. 562-575, June, 1915; vol. 16, pp. 66-80, July; pp. 124-146, August; pp. 357-380, October; pp. 506-514, December, 1915; and vol. 17, pp. 188-209, February, 1916.

States National Museum collection contains 529 specimens of East African *Crocidura*, including 19 types. The total number of specimens examined during my work in determining the specimens listed is thus 536, including 26 types. In addition to this East African material, I have enjoyed the privilege of working out at the United States National Museum the collection of shrews made by the Chapin and Lang Expedition to Belgian Congo. This valuable material, in the American Museum of Natural History, includes 12 forms of *Crocidura*, and a total of 119 specimens. There are six types.[1] It is obvious that no successful monographic work on African species of *Crocidura* is possible without consulting American collections.

CROCIDURA NYANSÆ NYANSÆ Neumann.

1900. *Crocidura flavescens nyansæ* NEUMANN, Zool. Jahrbüch., Syst., Geog. Biol., vol. 13, p. 544. (Fort Lubwa, Usoga, Uganda; type in Berlin Museum.)

1915. *Crocidura nyansæ* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 15, p. 565. June.

1916. *Crocidura nyansæ nyansæ* HOLLISTER, Bull. Amer. Mus. Nat. Hist., vol. 35, p. 664. October 21.

Specimens.—Nine, from the following localities:

UGANDA: Butiaba, 1 (Loring); Hoima, 1 (Loring); Kampala, 2 (Loring).

BRITISH EAST AFRICA: Kaimosi, 1 (Heller); Kakumega, 1 (Heller); Kisumu, 1 (Heller); Sirgoit Lake, Guas Ngishu Plateau, 2, including 1 in alcohol (Heller).

There is much variation in color shown in this small series of skins from the region defined by Dollman as the range of typical *Crocidura nyansæ*, but no specimen is quite so dark as skins of frequent occurrence in the series of *Crocidura nyansæ kijabæ*. The Sirgoit Lake skin is the darkest adult in the series. A skin from Kaimosi is in the red phase (or pelage), common also to *kijabæ*. The two skins from Unyora (Butiaba and Hoima) are the palest in the series, and suggest intergradation with the *doriana*-like *Crocidura daphnia* of the east banks of the Nile in northern Uganda.

The following manuscript notes on the type-specimen of *Crocidura flavescens nyansæ* are on file in the National Museum and were made by Edmund Heller in Berlin:

> Type No. A 5485, skin with skull; not marked type, but this is the female of which measurements are given in the original description. Color mummy-brown above, grayish below. Hind foot (skin), 19 millimeters. Skull: Condyloincisive length, 30; breadth of braincase, 12; upper tooth row, 13.5; length of mandible, including incisor, 18.5. Second unicuspid decidedly smaller than last.

A female of *C. n. nyansæ* collected by Heller at Kaimosi January 29 contained four embryos.

For measurements of specimens see table, page 44.

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[1] See Bull. Amer. Mus. Nat. Hist., vol. 35, pp. 663–680. October 21, 1916.

CROCIDURA NYANSÆ KIJABÆ Allen.

1909. *Crocidura kijabæ* Allen, Bull. Amer. Mus. Nat. Hist., vol. 26, p. 173. March 19. (Kijabe, British East Africa; type in Amer. Mus. Nat. Hist.)
1910. *Crocidura nyansæ* Roosevelt, African Game Trails, Amer. ed., pp. 480 and 487; London ed., pp. 491 and 498.

Specimens.—Twenty-five, from localities as follows:

British East Africa: Aberdare Mountains, 11,000 feet, 1 (Heller); Laikipia, 1 (Heller); Mount Kenia, 3, including 2 in alcohol (Mearns, Loring, Heller); Mount Umengo, 1 (Heller); Naivasha Station, 17 (Loring); Nakutichu River, Naivasha Plains, 1 (Heller); Nyeri, 1 (Loring).

Considerable individual variation in color is shown in this series of skins. The upperparts range from clear, rich, reddish brown to almost blackish, and the bellies from light gray or buff to a shade almost as dark as the back. The type-specimen of *kijabæ*, kindly lent me by the American Museum, through Dr. J. A. Allen, is a skin of the darkest style, with the body almost unicolor. In the Naivasha series, however, are specimens of both extremes, and it is evident that color subspecies of this large shrew should not be recognized unless based on long series of specimens. Dollman, who probably had access to more skins of typical *nyansæ* than I have seen, recognized this race on the generally darker color of the series when compared with the average color in a series of *nyansæ*. On the basis of our collection alone I should not have recognized the subspecies, although there are several skins considerably darker than any specimen in our small series of *nyansæ* proper.

The single specimen from the Taita Hills (Mount Umengo) appears inseparable from examples in the Naivasha series, although its locality is much nearer to the type region of a related species not represented in our collection, *Crocidura martiensseni* Neumann, than to the nearest point from which we have skins of *C. n. kijabæ*. Just what is the relationship between *kijabæ* and *martiensseni* seems uncertain, but the Kilimanjaro form is certainly a considerably larger shrew than either *kijabæ* or typical *nyansæ*. Heller has made the following notes on the type specimen of *martiensseni* in Berlin:

> Type ♀, alcoholic, No. 8909; Loc. Magrosso; specimen not marked type; skull extracted and cleaned. Skin, in alcohol, uniform mummy-brown, belly same as back; hind foot, 22 millimeters. Skull: Condyloincisive length, 33.5; breadth of braincase, 13.5; upper tooth row, 15; mandible, including incisor, 21.3.

Roosevelt, Heller, and Loring make the following remarks on the specimens of *C. n. kijabæ* collected by the Smithsonian African Expedition:[1]

> Chiefly in the high country, near water courses; found round the edge of the forest, at Kenia and Kijabe. A fierce, carnivorous creature, preying on small rodents as

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[1] African Game Trails, pp. 480 and 487. 1910.

Measurements of shrews of the Crocidura nyansæ group.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, from dry skin.	Skull: Condylobasal length.	Maxillary breadth.	Breadth of braincase.	Depth of braincase (median).	Mandible.	Upper tooth row (entire).	Condition of teeth.
C. n. nyansæ.												
Uganda:												
Butiaba	164896	Female	116	60	16.8	27.5	9.3	....	6.5	15.5	13.1	Moderately worn.
Hoima	164897	...do	115	72	18.0	....	9.1	12.2	6.2	15.1	12.7	Do.
B. E. A.:												
Kaimosi	182496	...do	120	79	19.2	28.7	9.1	11.4	6.7	15.5	13.6	Little worn.
Sirgoit Lake	163960	Male	145	81	19.8	31.2	10.0	13.6	7.2	16.8	14.0	Moderately worn.
Kisumu	182494	...do	120	82	19.7	....	9.4	....	....	16.0	13.7	Little worn.
C. n. kijabæ.												
B. E. A.:												
Naivasha	162023	Male	132	82	18.7	28.8	9.4	12.6	6.8	15.3	13.1	Moderately worn.
Do	162026	...do	144	89	20.7	30.7	9.8	13.5	7.6	16.3	13.9	Do.
Do	162034	...do	135	80	20.6	31.8	10.2	13.4	7.2	16.7	14.2	Do.
Do	162035	...do	134	74	19.2	29.8	9.8	12.9	7.3	16.3	13.4	Do.
Do	162036	...do	125	85	20.9	31.0	10.2	13.3	7.8	16.8	13.7	Do.
Do	162024	Female	133	81	19.8	28.5	9.7	12.6	6.9	16.5	13.0	Do.
Do	162025	...do	113	87	20.5	28.5	9.5	12.5	6.7	16.2	13.5	Unworn.
Do	162029	...do	131	77	19.0	29.0	9.0	12.0	6.4	15.1	13.5	Little worn.
Do	162031	...do	136	91	20.9	29.9	10.2	13.3	7.3	16.5	13.6	Do.
Do	162032	...do	123	72	19.8	28.4	9.4	12.3	6.7	15.7	12.8	Do.
Do	162037	...do	144	89	20.3	30.4	10.0	13.4	7.0	16.6	13.6	Do.
Do	182492	...do	115	83	20.3	29.7	9.3	12.6	6.7	15.7	13.2	Unworn.
Kijabe	[1] 27890	...do	123	78	19.2	29.0	9.8	12.0	6.4	15.9	14.0	Little worn.
Laikipia	163959	Male	150	88	21.3	32.4	10.5	12.9	7.1	18.4	14.8	Moderately worn.
Mount Kenia	163969	...do	142	88	19.5	29.4	9.4	12.8	6.5	16.4	13.6	Do.
Mount Umengo	182493	...do	115	81	18.6	28.0	9.3	12.1	6.2	15.4	13.0	Do.

well as insects; habitually ate mice, rats, or shrews which it found in the traps, and would then come back and itself be readily trapped (*Roosevelt* and *Heller*).

Giant shrews were common at Lake Naivasha, where most of them were caught in the thick reeds and rank grass bordering the lake. One was taken at Nyeri and another on Mount Kenia at an altitude of 10,700 feet. They seemed to be as much diurnal as nocturnal, and were captured in traps baited with rolled oats, dried apple, and raw meat. They inhabited the dense parts of the thickets, where the foliage had to be parted and a clearing made for the traps. These localities were the home of a large rat, and many of the rats captured were decapitated or partly eaten by animals that probably were giant shrews. A shrew captured alive was very ferocious and would seize upon anything that came within its reach. When fully excited and lifted into the air by its tail, it would emit a loud shrill chirping note (*Loring*).

For measurements see page 44.

CROCIDURA DAPHNIA Hollister.

Plate 7, figs. 3, 4.

1910. *Crocidura sururæ* HELLER, Smithsonian Misc. Coll., vol. 56, No. 15, p. 3. December 23. (Part, specimen from Gondokoro; not *C. sururæ* Heller, Smithsonian Misc. Coll., vol. 56, No. 15, p. 2.)

1915. *Crocidura sururæ* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 15, p. 571. June. (Part, specimens from Wadelai and Mongalla; not of Heller.)

1916. *Crocidura daphnia* HOLLISTER, Smithsonian Misc. Coll., vol. 66, No. 8, p. 1. May. (Gondokoro, Uganda; type in U. S. Nat. Mus.)

Specimen.—One, the type, as follows:

UGANDA: Gondokoro (Loring).

This species is quite different from the related *C. sururæ* of Lado and is evidently separated from the latter by the barrier of the Nile.

C. daphnia.												
Uganda: Gondokoro	[2]164898	Female	142	79	19.0	....	9.4	....	....	15.5	13.6	Moderately worn.
C. sururæ.												
Lado:												
Rhino Camp	[2]164637	Male	111	64	17.0	27.1	8.8	11.8	6.0	14.4	12.9	Unworn.
Do.	164890	...do	129	62	17.7	28.8	8.9	11.9	6.5	16.1	12.7	Moderately worn.
Do.	164888	Female	115	70	16.8	26.6	8.5	11.0	6.0	14.5	12.4	Considerably worn.
Do.	164889	...do	112	64	16.7	25.9	8.5	11.1	5.9	14.4	12.4	Little worn.
Do.	164891	...do	107	70	16.0	25.6	8.4	10.8	5.8	14.4	12.1	Do.
Do.	164892	...do	102	53	15.7	25.9	8.9	11.6	6.0	14.3	11.6	Do.
Do.	164893	...do	114	65	16.0	25.9	8.4	11.2	6.0	13.9	12.4	Do.
Do.	164894	...do	115	59	16.5	26.7	9.0	11.3	6.0	14.8	12.8	Moderately worn.
Do.	164895	...do	99	61	15.4	24.8	8.5	10.6	5.7	13.9	12.0	Unworn.

[1] Amer. Mus. Nat. Hist., type.

[2] Type.

It is in a way a connecting link between *C. doriana* Dobson of Abyssinia and *C. nyansæ* of Uganda, and may prove to intergrade with both. From *sururæ* of the western side of the Nile this species may readily be distinguished by its larger size and paler coloration.

CROCIDURA SURURÆ Heller.

Plate 7, figs. 11, 12.

1910. *Crocidura sururæ* HELLER, Smithsonian Misc. Coll., vol. 56, No. 15, p. 2. December 23. (Rhino Camp, Lado Enclave; type in U. S. Nat. Mus.)

Specimens.—Ten, as follows:

LADO: Rhino Camp (Loring).

This shrew is a member of the *nyansæ* group and is chiefly distinguished from *C. daphnia* of the east side of the Nile by its smaller size and darker, richer coloration. It is apparently confined to the western side of the Nile. The specimen from Gondokoro, which was placed with *sururæ* by Heller at the time of his publication of the species, has since become the type-specimen of *C. daphnia.*

For measurements of specimens of *C. daphnia* and *C. sururæ* see table, page 45.

CROCIDURA HINDEI Thomas.

1904. *Crocidura hindei* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 14, p. 237. September. (Machakos, British East Africa; type in British Museum.)

1910. *Crocidura fisheri* ROOSEVELT, African Game Trails, Amer. ed., p. 479; London ed., p. 491. (Part; not *C. fischeri* Pagenstecher.)

Specimens.—Three, from localities as follows:

BRITISH EAST AFRICA: Juja Farm, 2, including one in alcohol (Loring); Ulukenia Hills, 1 (Loring).

The Ulukenia Hills specimen, an adult male, shows both new and old pelages in about equal areas; one specimen from Juja Farm is immature and is much darker in color, above and below. The *Crocidura "fisheri"* listed in Appendix B of Roosevelt's African Game Trails refers in part to this species and partly to *C. jacksoni* Thomas. There is no specimen of *C. fischeri* in the collection.

For measurements see table, page 48.

CROCIDURA LUTRELLA Heller.

Plate 7, figs. 9, 10.

1910. *Crocidura lutrella* HELLER, Smithsonian Misc. Coll., vol. 56, No. 15, p. 4. December 23. (Rhino Camp, Lado Enclave; type in U. S. Nat. Mus.)

Specimens.—Fifteen, including four in alcohol, from—

LADO: Rhino Camp (Loring, Heller).

This species is related to *Crocidura parvipes* Osgood from Voi, British East Africa, and to *C. p. nisa* Hollister from Kibabe, Kisumu, and differs from them chiefly in its paler color. I believe that all three forms will eventually be found to intergrade, and that all may prove to be subspecies of *Crocidura fulvaster* (Sundevall).[1] In fact, I can not distinguish specimens of *lutrella* from the description of *fulvaster*, and would not be surprised if the two names referred to the same form. The type-locality of *fulvaster* is on the Bahr el Abiad (White Nile). This locality is some distance from the region where *lutrella* was collected, and I do not feel justified in treating the two names as synonyms without specimens of *fulvaster* for actual comparison. Dollman placed *fulvaster* among his undetermined species,[2] but suggests its identity with *C. sericea* Sundevall, a member of the *hindei* group.

For measurements of specimens see table, page 48.

CROCIDURA PARVIPES PARVIPES Osgood.

1910. *Crocidura parvipes* Osgood, Field Mus., Zool. Ser., vol. 10, No. 3, p. 19. April 7. (Voi, British East Africa; type is Field Mus. Nat. Hist.)

Specimen.—One in alcohol from—

British East Africa: Fort Hall (Loring).

This specimen, though clearly referable to *C. parvipes parvipes*, is somewhat intermediate in characters between true *parvipes* and *C. p. nisa.*

In Dollman's monograph of the African species of *Crocidura* this species is placed in the *jacksoni* group. The type-specimen, which I have before me, thanks to the authorities of the Field Museum, shows clearly that the species is not closely related to *jacksoni*, but belongs in a section of the *hindei* group containing the three small forms, *lutrella*, *parvipes*, and *nisa*.

CROCIDURA PARVIPES NISA Hollister.

Plate 7, figs. 17, 18.

1916. *Crocidura parvipes nisa* Hollister, Smithsonian Misc. Coll., vol. 66, No. 8, p. 2. May. (Kibabe, Kisumu, British East Africa; type in U. S. Nat. Mus.)

Specimen.—One from—

British East Africa: Kibabe (Heller).

The type-specimen, collected January 20, contained five embryos. This shrew is close to *Crocidura parvipes* Osgood. It is somewhat darker in color than the type of *parvipes* and very much darker than any skin in the series of 11 specimens of *C. lutrella* of Lado. The single specimen in our collection which I have referred to *Crocidura parvipes parvipes* is clearly intermediate between *parvipes* and *nisa*.

For measurements of specimens of *C. parvipes*, see page 48.

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[1] Kongl. Vet.-Acad. Handl., 1842, p. 172. 1843.

[2] Ann. and Mag. Nat. Hist., ser. 8, vol. 17, p. 208. February, 1916.

Measurements of shrews of the Crocidura hindei-fischeri group.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: Condylobasal length.	Maxillary breadth	Breadth of brain-case.	Depth of brain-case (median).	Mandible.	Upper tooth row (entire).	Condition of teeth.
C. hindei.												
B. E. A.:												
Ulukenia Hills	164047	Male	92	47	14.2	23.8	7.5	9.8	5.0	12.7	10.3	Moderately worn.
Juja Farm	161698	Female	98	47	13.0	22.6	....	9.8	5.4	12.3	10.3	Unworn.
C. lutrella.												
Lado: Rhino Camp	[1] 164640	Male	80	40	12.0	20.1	6.8	9.1	5.4	11.1	9.0	Unworn.
Do	164866	...do	88	42	11.0	19.2	6.7	8.8	4.9	10.6	8.5	Little worn.
Do	164869	...do	83	38	12.0	20.7	7.0	9.3	5.4	11.4	9.3	Unworn.
Do	164870	...do	85	39	11.5	19.8	7.0	8.9	4.8	11.1	8.8	Do.
Do	164873	...do	85	41	11.8	20.0	7.1	9.3	5.4	10.8	8.8	Much worn.
Do	164874	...do	81	38	11.5	20.2	7.2	9.0	5.3	10.9	8.9	Considerably worn.
Do	164875	...do	81	37	11.5	20.5	6.8	9.2	5.0	11.1	9.4	Little worn.
Do	164867	Female	71	40	11.0	19.2	6.4	....	....	10.6	8.5	Moderately worn.
Do	164872	...do	75	34	11.3	20.2	6.3	8.8	5.1	11.0	8.7	Do.
C. p. parvipes.												
B. E. A.:												
Voi	[2] 16890	Male	84	38	11.3	....	7.1	9.5	5.1	11.2	8.7	Moderately worn.
Fort Hall	165517	Female	....	....	....	19.4	6.7	8.6	5.0	10.7	8.5	Much worn.
C. p. nisa.												
B. E. A.: Kibabe	[1] 182440	Female	80	38	11.3	19.6	6.9	9.0	5.3	11.0	8.9	Moderately worn.
C. percivali.												
B. E. A.: Lakiundu River	182576	Male	80	48	12.0	20.6	6.3	9.0	4.8	10.7	9.0	Little worn.
Do	182577	Female	80	48	12.2	....	6.1	....	....	10.3	8.8	Moderately worn.

C. suahelae.													
B. E. A.:													
Mazeras	[1]181815	Male	110	69	16.0	25.4	8.1	10.7	5.8	13.5	11.4	Little worn.
Do	182555	...do...	93	60	14.6	22.7	7.8	10.2	5.4	12.6	10.5	Unworn.
Do	182558	...do...	105	64	15.7	24.6	8.2	10.7	5.7	13.2	10.9	Little worn.
Do	182559	...do...	105	58	15.1	23.8	8.1	10.5	5.6	12.7	10.5	Moderately worn.
Do	182561	...do...	107	67	15.3	25.2	8.5	10.8	5.9	13.4	11.2	Do.
Do	182566	...do...	102	63	14.8	24.4	8.0	10.4	5.6	12.4	10.7	Little worn.
Do	182568	...do...	105	56	14.9	24.5	7.9	10.7	5.5	12.6	10.8	Do.
Do	182569	...do...	95	61	14.8	23.2	8.0	10.2	5.3	12.3	10.5	Do.
Do	182570	...do...	100	57	15.4	24.3	8.1	10.7	5.9	12.6	10.5	Moderately worn.
Do	182571	...do...	98	50	14.8	23.9	8.0	10.9	6.0	12.8	10.6	Little worn.
Do	182572	...do...	95	52	15.2	23.2	7.9	10.6	5.9	12.2	10.8	Do.
Do	182573	...do...	102	58	15.6	24.1	7.9	11.0	5.7	12.2	10.2	Do.
Do	182574	...do...	95	52	14.7	22.3	7.8	9.7	5.3	11.8	10.3	Unworn.
Do	182556	Female	115	60	14.7	24.3	8.1	10.5	5.8	12.7	....	Moderately worn.
Do	182560	...do...	98	65	15.8	24.2	8.0	10.4	5.7	12.6	11.0	Unworn.
Do	182562	...do...	105	60	14.5	23.9	7.9	10.0	5.4	13.2	10.7	Little worn.
Do	182563	...do...	102	56	14.7	23.3	7.8	10.1	5.6	12.4	10.8	Unworn.
Do	182564	...do...	95	58	15.0	23.3	7.9	10.1	5.4	12.7	10.6	Do.
Do	182567	...do...	90	55	15.1	22.6	7.5	10.0	5.4	12.7	10.4	Do.
Changamwe	164044	...do...	....	....	14.6	22.6	7.8	9.8	5.6	12.5	10.2	Do.
C. simiolus.													
B. E. A.:													
Kaimosi	182497	Male	115	80	17.1	26.2	8.5	11.1	6.3	14.1	12.2	Little worn.
Do	182495	Female	100	73	17.2	25.9	8.4	11.2	5.9	15.1	12.3	Unworn.
Kibabe	182471	...do...	100	....	16.6	26.2	8.4	10.6	5.9	13.5	12.0	Do.
Kisumu	[2]7959	...do...	113	60	17.0	26.1	8.3	11.1	6.4	13.7	12.3	Little worn.
C. mutesæ.													
Uganda: Kampala	[3]164636	...do...	115	64	16.0	24.6	8.0	11.0	6.2	13.4	11.3	Moderately worn.

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[1] Type.

[2] Field Mus. Nat. Hist., type.

[3] Type; erroneously given as 174636 in original description.

CROCIDURA PERCIVALI Dollman.

1915. [*Crocidura*] *percivali* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 15, p. 513. May. (Jombeni Range, British East Africa; type in British Museum.)

1915. *Crocidura percivali* DOLLMAN, Ann. and Mag. Nat. His., ser. 8, vol. 16, p. 126. August.

Specimens.—Two, from—

BRITISH EAST AFRICA: Lakiundu River (Heller).

The shrew described by Osgood as *Crocidura xantippe*,[1] type-locality Voi, was placed by Dollman in the *jacksoni* group, but it is not closely related to *jacksoni* or its allies, and agrees with the members of the *hindei-fischeri* group in all essential characters—coloration; the long narrow rostrum; strong, wide maxillary processes; narrow posterior border of the bony palate; and the enlarged first upper unicuspid. It is in fact very closely related to *Crocidura percivali*, but is larger and lighter colored, with larger skull and teeth. Another East African shrew not represented in the National Museum collection is *Crocidura voi* Osgood.[2] While not closely related to any species known to me, it has, nevertheless, many decided characteristics of the *hindei* group, but differs in its slaty coloration, short, light-colored tail, and massive dentition. The type-specimens of *C. xantippe* and *C. voi* have been lent me by the Field Museum of Natural History, Chicago, in connection with this work.

For measurements of specimens see page 48.

CROCIDURA SUAHELÆ Heller.

Plate 7, figs. 15, 16.

1912. *Crocidura suahelæ* HELLER, Smithsonian Misc. Coll., vol. 60, No. 12, p. 6. November 4. (Mazeras, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Twenty-five, from localities as follows:

BRITISH EAST AFRICA: Changamwe, 1 (Mearns); Mazeras, 24, including 3 in alcohol (Heller).

This pale coast species is, following Dollman, here placed in the *fischeri* group, although it and its two allies (*simiolus* and *mutesæ*) certainly show many characteristics of the *nyansæ* group, some species of which it approaches in size. It is only slightly smaller than *C. sururæ* of Lado. The two smaller upper unicuspids are virtually of the same size, and either the second or the third may, in certain specimens, appear the larger. No specimen in the series shows anything approaching the relatively smaller third upper unicuspid as in the type of *Crocidura voi*, where the difference is very pronounced, the second being nearly twice the size of the third.

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[1] Field Mus. Nat. Hist., Zool. Ser., vol. 10, No. 3, p. 19. April 7, 1910.

[2] Field Mus. Nat. Hist., Zool. Ser., vol. 10, No. 3, p. 18. April 7, 1910.

The musky odor of specimens, even of dried skins collected several years, is particularly noticeable in this species.

For table of measurements see page 49.

CROCIDURA SIMIOLUS Hollister.

Plate 7, figs. 13, 14.

1916. *Crocidura simiolus* Hollister, Smithsonian Misc. Coll., vol. 66, No. 8, p. 3. May. (Kisumu, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Four, from the following localities:

British East Africa: Kaimosi, 2 (Heller); Kibabe, 1 (Heller); Kisumu, 1 (Turner).

The range of this species seems somewhat restricted, as it appears in the collection only from the vicinity of Kavirondo Gulf, where it was captured in localities with the larger *Crocidura nyansæ nyansæ*. Externally it greatly resembles certain specimens of *nyansæ* but can instantly be separated from them by its smaller skull. It is nearest related to *C. suahelæ* and C. *mutesæ*, but is slightly larger than either. In color it is very similar to the darker specimens of *suahelæ*, and in the red phase is almost indistinguishable externally from the type-specimen of *mutesæ*.

CROCIDURA MUTESÆ Heller.

Plate 8, figs. 1, 2.

1910. *Crocidura mutesæ* Heller, Smithsonian Misc. Coll., vol. 56, No. 15, p. 3. December 23. (Kampala, Uganda; type in U. S. Nat. Mus.)

Specimen.—One, the type, from—

Uganda: Kampala (Loring).

This shrew was originally described as a member of the *turba* group, and was so placed by Dollman in his synopsis of the African species of *Crocidura*. The two specimens recorded with the type from Uganda, in the original description, are, indeed, *Crocidura turba zaodon*, but the type itself is not a member of the same group and proves to be closely related to *Crocidura suahelæ* and to the Kavirondo *C. simiolus*. The skull of the type-specimen of *mutesæ* is scarcely distinguishable from skulls of *suahelæ*, but in color the skin is very different, and looks almost exactly like the reddish-brown specimens of *nyansæ* and *simiolus*.

For measurements of specimens of *C. simiolus* and *C. mutesæ* see table, page 49.

CROCIDURA TURBA NILOTICA Heller.

Plate 8, figs. 3, 4.

1910. *Crocidura nilotica* Heller, Smithsonian Misc. Coll., vol. 56, No. 15, p. 3. December 23. (Rhino Camp, Lado Enclave; type in U. S. Nat. Mus.)

1916. *Crocidura turba nilotica* Hollister, Bull. Amer. Mus. Nat. Hist., vol. 35, p. 664. October 21.

Specimens.—Fifteen, including seven in alcohol, from:

Measurements of specimens of the subspecies of Crocidura turba.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: Condylobasal length.	Maxillary breadth	Breadth of brain case.	Depth of brain case (median).	Mandible.	Upper tooth row (entire).	Condition of teeth.
C. t. nilotica.												
Lado:												
Rhino Camp	164882	Male	93	52	16.0	23.0	7.5	10.3	5.7	12.6	10.6	Unworn.
Do	164884	...do	97	52	15.0	22.8	7.0	9.5	5.9	12.3	10.5	Do.
Do	164886	...do	96	50	15.0	22.8	7.0	10.2	5.8	11.9	10.0	Moderately worn.
Do	164887	...do	102	51	15.0	22.6	7.2	10.0	5.9	12.0	10.1	Do.
Do.	[1] 164638	Female	92	48	14.5	22.0	7.4	10.1	6.0	12.0	10.2	Do.
Do	164885	...do	88	51	14.0	21.2	6.6	9.3	5.2	11.5	9.4	Do.
C. t. zaodon.												
Uganda:												
Hoima	164879	Male	101	60	15.5	23.7	7.2	10.0	5.9	12.7	10.5	Moderately worn.
Ledgus	164903	...do	107	65	16.5	24.1	7.7	10.3	5.7	13.0	10.8	Little worn.
Kabula Muliro	164877	Female	97	54	15.5	23.7	7.5	9.8	5.8	12.6	10.5	Do.
Butiaba	164878	...do	90	51	15.0	21.6	7.3	9.8	5.7	11.9	10.1	Do.
Gondokoro	164902	...do	104	57	15.0	23.6	7.4	10.5	5.7	12.8	9.9	Much worn.
B. E. A.:												
Guas Ngishu	164041	Male	95	51	14.5	21.8	7.0	9.8	5.9	11.4	10.0	Little worn.
Do	164043	...do	100	55	16.0	22.7	7.1	10.0	5.9	11.8	10.0	Do.
Kakumega	182475	...do	90	54	15.0	22.1	7.2	9.9	5.8	12.8	10.0	Moderately worn.
Kibabe	182472	...do	92	60	16.0	23.5	7.7	10.3	5.9	12.8	10.5	Do.
Do	182470	Female	85	56	14.5	21.5	6.8	9.7	5.7	11.8	9.8	Little worn.
Kisumu	182473	....	95	56	15.0	23.0	7.3	9.9	6.0	12.0	10.3	Moderately worn.
Kaimosi	182537	Male	95	58	16.0	22.9	7.0	10.1	5.7	12.2	9.9	Do.
Do	182543	...do	90	54	15.0	22.1	7.3	9.8	5.8	11.9	9.8	Little worn.
Do	182544	...do	95	60	15.5	23.4	7.4	10.1	5.7	12.7	10.8	Moderately worn.
Do	182482	Female	95	54	14.5	21.7	7.1	10.0	5.4	12.0	10.0	Do.

Do	182538	...do....	90	59	15.0	23.0	7.3	9.8	5.8	12.3	10.6	Do.
Do	182539	...do....	98	60	15.5	22.9	7.4	10.1	5.9	12.5	10.3	Do.
Do	182540	...do....	85	52	15.0	21.7	7.3	9.8	5.7	11.3	9.6	Little worn.
Do	182541	...do....	87	51	14.5	21.4	6.9	9.7	5.8	11.6	9.8	Do.
Naivasha Plains	182529	Male....	88	45	15.5	22.8	7.5	10.3	6.1	12.0	10.5	Do.
Do	182530	...do....	95	61	16.0	23.2	7.4	10.4	6.2	12.5	10.6	Unworn.
Nairobi	[2] 16929	...do....	98	60	16.0	23.5	7.3	10.2	5.9	12.2	10.7	Little worn.
Nyeri	182525	...do....	90	62	16.0	23.1	7.4	9.8	....	12.5	10.6	Unworn.
Mount Kenia	164039	...do....	97	56	16.5	23.1	7.5	10.2	5.7	12.4	10.8	Do.
Aberdare Mountains	182526	...do....	80	50	14.0	....	6.7	....	....	11.9	9.9	Little worn.
Do	182528	...do....	98	57	16.0	23.6	7.5	10.6	6.3	12.7	10.5	Do.
Do	182527	Female..	85	48	14.5	21.9	7.1	....	....	11.7	9.9	Moderately worn.
Isiola River	182450	Male....	100	52	15.5	23.0	7.1	10.1	5.9	12.3	10.2	Do.
Lakiunda River	182451	...do....	100	55	15.5	22.9	7.4	9.9	5.6	12.4	10.2	Do.
Do	182452	...do....	100	57	16.0	....	7.3	....	....	12.4	10.5	Unworn.
Do	182453	...do....	....	....	15.0	....	7.1	....	....	12.3	9.9	Considerably worn.
Do	182454	...do....	85	59	15.5	....	7.2	....	....	12.3	10.1	Moderately worn.
Do	182466	...do....	90	59	15.5	22.1	7.1	9.8	5.3	11.7	10.2	Little worn.
Do	182580	...do....	....	....	....	22.0	7.1	9.7	5.7	11.9	9.4	Much worn.
Do	[3] 181816	Female..	95	57	15.5	22.0	7.2	9.8	5.5	12.0	10.0	Little worn.
Archer's Post	182467	Male....	100	52	15.5	....	....	....	....	12.2	10.2	Do.
Mount Mbololo	182461	...do....	85	50	15.0	22.2	6.8	9.8	5.9	12.0	10.2	Moderately worn.
Mount Umengo	182462	...do....	90	64	16.0	23.4	7.3	10.5	6.0	12.5	10.4	Do.
Sagalla	182463	...do....	85	55	15.5	22.3	6.8	9.8	5.6	12.2	10.1	Do.
Do	182464	Female..	95	61	15.5	22.5	6.8	9.8	5.9	12.4	10.3	Do.
Do	182465	...do....	85	60	14.5	21.6	6.5	9.4	5.7	11.8	9.8	Little worn.
Do	182469	Male....	90	62	16.0	22.8	7.1	10.0	6 0	12.3	10.5	Do.

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[1] Type.

[2] Field Mus. Nat. Hist., type.

[3] Type of *Crocidura turba lakiundæ*,

LADO: Rhino Camp (Loring, Mearns).

This small, blackish race of *turba* is apparently confined to the western side of the Nile; all the skins from the Uganda shores are referable to the wide ranging subspecies *zaodon*.

CROCIDURA TURBA ZAODON Osgood.

Plate 8, figs. 5, 6.

1910. *Crocidura turba zaodon* OSGOOD, Field Mus., Zool. Ser., vol. 10, No. 3, p. 21. April 7. (Nairobi, British East Africa; type in Field Mus. Nat. Hist.)

1910. *Crocidura turba provocax* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 6, p. 112. July. (Aberdare Mts., British East Africa; type in British Museum.)

1912. *Crocidura turba lakiundæ* HELLER, Smithsonian Misc. Coll., vol. 60, No. 12, p. 6. November 4. (Lakiunda River, near its junction with the Northern Guaso Nyiro River, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Ninety-nine, including 46 in alcohol, from localities as follows:

UGANDA: Butiaba, 4 (Loring, Heller); Gondokoro, 1 (Loring); Hoima, 1 (Loring); Kampala, 1 (Loring); Kabula Muliro, 2 (Loring); Ledgus, 1 (Loring).

BRITISH EAST AFRICA: Aberdare Mountains, 5 (Heller); Archer's Post, Northern Guaso Nyiro, 2 (Heller); Fort Hall, 2 (Loring); Isiola River, head, 2 (Heller); Kaimosi, 32 (Heller); Kakumega, 1 (Heller); Kibabe, 2 (Heller); Kisumu, 1 (Heller); Laikipia Plateau, 15 miles north of Nyeri, 1 (Heller); Lakiunda River, 11 (Heller); Lukosa River, 1 (Heller); Meru, 1 (Heller); Mount Kenia, west slope, 11 (Heller, Loring); Mount Mbololo, 1 (Heller); Mount Sagalla, 4 (Heller); Mount Umengo, 1 (Heller); Naivasha Plains, 2 (Heller); Nyangnori, 1 (Heller); Nzoia River, Guas Ngishu Plateau, 4 (Heller); Sirgoit, 2 (Heller); Sirgoit Lake, 2 (Heller).

A careful study of this excellent suite of specimens from widely separated parts of Uganda and British East Africa shows that while there is considerable variation in size and color these variations are by no means geographic, and that only one subspecies can be recognized from within this area. A moment's study of the accompanying table of measurements will show that length of tail and size of hind foot are characters of no importance for separating races in the Aberdares or Northern Guaso Nyiro from true *zaodon* of Nairobi or from the specimens taken in Uganda. The Gondokoro and Ledgus, Uganda, specimens can be almost exactly matched by skins in the series from the mountains in extreme southeastern British East Africa (Sagalla, Umengo, and Mbololo). While the majority of the skins are in the lighter brownish pelage usual to the race, there are specimens in the fresh, rich, dark, seal-brown coat (like the type) from many localities. Two alcoholic specimens from Butiaba, Uganda, are chiefly in an old, decidedly reddish coat, quite unlike others, but show the new dark coat on head and shoulders.

The two specimens from Uganda (Gondokoro and Kampala) referred by Heller[1] to his *Crocidura mutesæ* clearly belong here rather than with the type of *mutesæ;* and the specimens from Uganda (Butiaba, Hoima, and Kabula Muliro) which were referred by Heller[2] to *nilotica* seem to me to belong without question to *zaodon*, though approaching the smaller and darker *nilotica* in one character, the shortness of the fur.

Still another East African race of *turba* has been described by Dollman[3] from Kirui, Mount Elgon, as *Crocidura turba kempi*. No topotypes of this form are in our collection, but specimens from the Guas Ngishu Plateau, which should represent it, are indistinguishable from *zaodon*.

A female collected by Heller at Kibabe, January 20, contained three embryos; and one from Kaimosi, January 29, two embryos.

For measurements of specimens of the subspecies of *C. turba* see table, page 52.

CROCIDURA FUMOSA FUMOSA Thomas.

Plate 8, figs. 7, 8.

1904. *Crocidura fumosa* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 14, p. 238. September. (Western slope of Mt. Kenia, British East Africa; type in British Museum.)

1910. *Crocidura fumosa* ROOSEVELT, African Game Trails, Amer. ed., pp. 474 and 479; London ed., pp. 486 and 491.

1910. *Crocidura alchemillæ* HELLER, Roosevelt's African Game Trails, Amer. ed. p. 480; London ed., p. 491. (Summit of Aberdare Range, British East Africa; type in U. S. Nat. Mus.)

Specimens.—One hundred and twenty-eight, from localities as follows:

BRITISH EAST AFRICA: Aberdare Mountains, 4 (Heller); Fort Hall, 8 (Loring); Nyeri, 1 in alcohol (Loring); upper Nzoia River, 4 in alcohol (Heller); west side of Mount Kenia, 111, including 20 in alcohol (Loring, Mearns, Heller).

After careful study of this fine series of specimens, I am unable to recognize as distinct the smoky shrew of the Aberdare Mountains. While there is considerable individual variation in color, true *fumosa* is usually recognizable from the grayer *schistacea* and the darker, more blackish, *selina* by color alone. The skulls of typical *fumosa* average smaller than those of the more southern and western subspecies, and are much less in size than the skulls of its more northern ally, *Crocidura raineyi*.

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[1] Smithsonian Misc. Coll., vol. 56, No. 15, p. 3. Dec. 23.

[2] Smithsonian Misc. Coll., vol. 56, No. 15, p. 4. Dec. 23.

[3] Ann. and Mag. Nat. Hist., ser. 8, vol. 15, p. 511; and vol. 16, p. 134. May and August, 1915.

Measurements of Specimens of the Crocidura fumosa group.

Species and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: Condylobasal length.	Maxillary breadth	Breadth of brain-case.	Depth of brain-case (median).	Mandible.	Upper tooth row (entire).	Condition of teeth.
C. f. fumosa.												
B. E. A.: Mount Kenia	164074	Male	81	51	15.2	20.3	6.2	9.9	5.5	10.2	9.0	Much worn.
Do.	164075	...do	81	52	14.8	20.4	6.1	10.0	5.3	11.1	9.4	Little worn.
Do.	164078	...do	80	50	14.5	20.0	6.0	9.7	5.3	11.0	9.0	Moderately worn.
Do.	164079	...do	....	....	14.8	20.0	6.4	10.2	5.2	10.9	9.1	Do.
Do.	164083	...do	81	53	14.7	19.8	5.8	9.6	5.4	11.1	9.0	Little worn.
Do.	164092	...do	76	41	14.3	19.8	5.9	9.8	5.3	10.9	9.3	Do.
Do.	164095	...do	81	49	14.2	20.1	5.9	9.3	5.4	10.9	9.3	Do.
Do.	164097	...do	81	55	14.0	19.3	6.0	9.6	5.3	10.8	8.9	Do.
Do.	164103	...do	85	58	14.4	19.8	6.0	9.7	5.7	10.3	8.6	Moderately worn.
Do.	164105	...do	79	57	15.0	20.0	6.1	9.9	5.5	11.2	9.3	Little worn.
Do.	164106	...do	83	60	15.2	20.5	6.4	10.0	5.7	11.2	9.0	Moderately worn.
Do.	164113	...do	78	54	14.2	20.7	6.8	9.7	5.6	11.0	9.4	Do.
Do.	164119	...do	80	48	14.4	20.5	6.2	9.9	5.6	11.3	9.2	Little worn.
Do.	164121	...do	86	52	14.7	21.0	6.3	10.1	5.6	11.2	9.1	Moderately worn.
Do.	164123	...do	78	54	14.7	19.8	6.0	9.8	5.4	11.2	9.1	Little worn.
Do.	164124	...do	75	50	15.1	20.6	6.0	10.2	5.5	11.5	9.4	Do.
Do.	164126	...do	75	55	14.7	20.0	6.2	10.2	5.6	11.2	9.3	Do.
Do.	164127	...do	80	55	14.0	19.7	6.1	10.0	5.7	10.9	8.5	Moderately worn.
Do.	164128	...do	85	49	14.7	20.1	6.4	9.8	5.4	10.9	9.1	Do.
Do.	164132	...do	81	49	14.5	19.8	6.1	9.8	5.3	10.8	8.8	Do.
Do.	164135	...do	82	49	14.7	21.3	6.3	9.8	5.4	11.1	9.2	Do.
Do.	164138	...do	77	....	14.9	20.2	6.3	9.8	5.7	10.8	9.1	Do.
Do.	164048	Female	85	53	15.2	20.2	6.2	10.1	5.8	11.0	8.9	Do.
Do.	164051	...do	81	58	14.8	20.8	6.3	10.3	5.8	11.4	8.8	Much worn.
Do.	164052	...do	77	56	14.1	19.8	6.2	9.5	5.4	10.7	8.9	Moderately worn.

Do	164057	...do....	78	53	13.9	19.4	5.9	9.7	5.2	10.6	8.7	Little worn.
Do	164058	...do....	78	47	14.0	19.4	6.1	9.8	5.4	....	8.9	Do.
Do	164064	...do....	76	54	14.1	19.8	6.2	9.8	5.4	10.9	8.9	Do.
Do	164065	...do....	92	49	14.6	20.5	6.0	9.7	5.3	11.2	9.3	Moderately worn.
Do	164069	...do....	81	51	14.8	20.2	6.0	9.7	5.1	11.3	9.5	Do.
Do	164072	...do....	85	55	14.3	20.5	6.2	10.1	5.7	11.2	9.1	Do.
Do	164077	...do....	79	57	15.1	20.2	6.2	9.9	5.6	11.1	9.4	Little worn.
Do	164080	...do....	73	57	14.3	20.2	6.0	9.8	5.4	10.9	9.4	Do.
Do	164084	...do....	75	52	14.3	20.7	6.2	9.8	5.6	11.1	9.4	Do.
Do	164086	...do....	80	57	14.5	20.1	6.0	10.0	5.2	11.4	8.9	Moderately worn.
Do	164087	...do....	81	58	15.0	20.5	6.2	10.0	6.0	11.3	9.4	Do.
Do	164100	...do....	75	48	14.1	20.9	5.8	9.7	5.2	10.9	8.9	Do.
Do	164101	...do....	81	52	14.2	20.6	6.0	10.1	5.5	11.2	9.2	Little worn.
Do	164109	...do....	82	56	15.5	20.5	6.2	9.7	5.6	11.1	9.4	Do.
Do	164112	...do....	82	50	14.2	19.8	5.9	9.5	5.2	10.3	8.9	Do.
Do	164136	...do....	77	52	13.8	19.8	5.8	9.8	5.2	10.7	9.0	Do.
B. E. A.: Fort Hall	163946	Male....	82	54	14.0	20.7	6.7	9.7	5.7	11.8	9.6	Do.
Do	163947	...do....	78	47	13.0	20.3	6.5	9.5	5.4	11.4	9.4	Do.
Do	163949	...do....	80	42	13.9	20.4	6.4	9.2	5.3	....	8.9	Much worn.
Do	163944	Female.	77	47	13.0	20.3	6.3	9.6	5.4	11.3	9.5	Little worn.
B. E. A.: Aberdare Mountains	[1] 163087	Male....	90	55	14.5	20.1	5.9	9.6	5.6	10.5	8.9	Do.
Do	163941	Female.	90	54	14.0	19.7	6.2	9.4	5.5	11.0	8.9	Unworn.
Do	182441	...do....	85	41	15.0	20.7	6.3	10.1	5.7	11.3	....	Moderately worn.
C. f. schistacea.												
B. E. A.: Ulukenia Hills	[2] 16884	...do....	93	52	14.7	22.0	7.3	10.1	5.7	13.0	10.2	Do.
Do	164045	...do....	86	45	13.3	21.8	7.0	10.0	5.6	12.0	9.9	Much worn.
Do	164046	...do....	81	47	13.7	21.2	6.9	9.4	5.4	11.8	9.8	Moderately worn.
B. E. A.: Kapiti Plain	161694	Male....	83	53	14.0	21.6	7.0	9.8	5.7	12.0	9.8	Little worn.
Do	161697	...do....	75	46	13.7	20.6	7.0	9.5	5.4	11.7	9.5	Do.
C. f. selina.												
Uganda: Kisimbiri	164880	...do....	82	54	13.7	21.2	7.0	....	5.7	11.7	9.6	Do.
B. E. A.: Kaimosi	182442	...do....	80	60	14.3	22.3	6.9	10.2	5.9	11.8	9.9	Much worn.
Do	182443	...do....	85	60	14.5	22.0	7.0	10.2	6.0	12.0	9.8	Moderately worn.

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[1] Type of "*Crocidura alchemillæ.*"

[2] Field Mus. Nat. Hist., Chicago; type.

Measurements of Specimens of the Crocidura fumosa group—Continued.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: condylobasal length.	Maxillary breadth	Breadth of brain-case.	Depth of brain-case (median).	Mandible.	Upper tooth row (entire).	Condition of teeth.
C. f. selina—Continued.												
B. E. A.: Kaimosi	182444	Male	85	58	15.0	22.0	6.9	10.5	5.9	11.7	9.9	Moderately worn.
Do	182445	...do	85	63	15.0	22.6	7.1	10.4	6.0	12.0	10.3	Do.
Do	182478	...do	88	64	15.0	22.3	7.0	10.6	5.8	12.1	10.0	Do.
Do	182480	...do	80	57	14.4	22.1	6.8	10.2	5.8	12.1	9.7	Do.
Do	182483	...do	85	57	14.8	22.1	7.0	10.1	5.8	12.2	9.9	Do.
Do	182488	...do	80	58	13.9	21.3	6.8	9.9	5.5	11.8	9.9	Little worn.
Do	182446	Female	77	60	15.0	21.9	6.9	10.4	6.0	11.8	9.9	Moderately worn.
Do	182485	...do	83	63	14.8	20.5	6.1	9.4	5.7	11.0	9.0	Unworn.
Do	182486	...do	80	56	15.0	21.8	7.1	10.2	5.6	12.3	10.1	Moderately worn.
Do	182487	...do	80	55	15.0	21.4	6.8	9.8	5.7	11.7	9.6	Do.
C. raineyi.												
B. E. A.: Mount Gargues	[1] 181817	Male	90	61	15.5	24.0	7.8	10.5	5.9	13.1	11.0	Do.
Do	182468	...do	90	57	15.6	24.2	7.8	10.3	5.9	12.9	10.9	Do.
Do	182548	...do	92	64	16.0	24.2	7.9	10.7	6.2	13.4	11.0	Do.
Do	182549	...do	92	63	16.0	24.3	8.0	10.7	6.0	13.3	11.1	Do.
Do	182551	...do	90	65	15.5	24.5	7.9	10.7	6.0	13.5	11.1	Do.
Do	182552	...do	90	60	15.5	24.0	7.9	10.6	5.9	13.6	11.2	Do.
Do	182553	...do	92	65	16.0	....	7.9	....	....	13.3	11.0	Little worn.
Do	182554	...do	90	64	16.0	24.0	8.1	11.1	5.9	13.5	11.0	Moderately worn.
Do	182550	Female	90	59	15.5	23.9	7.8	11.6	5.9	13.1	10.9	Do.

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[1] Type.

CROCIDURA FUMOSA SCHISTACEA Osgood.

1910. *Crocidura fumosa schistacea* OSGOOD, Field Mus., Zool. Ser., vol. 10, No. 3, p. 20. April 7. (Ulukenia Hills=Lukenya Mountains, British East Africa; type in Field Mus. Nat. Hist.)

Specimens.—Five, from the following localities:

BRITISH EAST AFRICA: Kapiti Plains, 3 (Loring); Ulukenia Hills, 2 (Loring).

A female collected by Loring on the Kapiti Plains, May 7, contained six small embryos; one from Ulukenia Hills, November 25, contained five embryos, each about 8 millimeters in length.

The type-specimen of this shrew, which has been lent me by the Field Museum of Natural History, Chicago, is slightly larger than any specimen in our small series. The form is mainly differentiated from *Crocidura fumosa fumosa* by its grayish, less brownish color; but it averages larger, with larger and heavier skull, and there is usually a less conspicuous difference in the size of the second and third unicuspid teeth. I mistrust that this is the species described by Dollman in 1915 as *Crocidura luna umbrosa*,[1] type-locality Machakos. There seems to be no reason to separate the two from the description, and Dollman evidently had no specimens which he referred to *schistacea* when preparing his synopsis of the forms of *Crocidura*.

For measurements of specimens of the subspecies of *C. fumosa* see table, pages 56-58.

CROCIDURA FUMOSA SELINA Dollman.

1915. [*Crocidura*] *f. selina* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 15, p. 510. May. (Mabiri Forest, Chagwe, Uganda; type in British Museum.)

1915. *Crocidura fumosa selina* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 16, p. 371. October.

Specimens.—Seventeen, from localities as follows:

UGANDA: Kampala, 3 in alcohol (Heller, Loring); Kisimbiri, 1 (Loring).

BRITISH EAST AFRICA: Kaimosi, 13 (Heller).

Heller records one female with one embryo and one with three at Kaimosi, January 27 and 28.

This subspecies is well differentiated from true *fumosa* and from *schistacea* by its darker, more blackish coloration and larger skull. Although its range extends eastward along the north shore of Victoria Nyanza to Kaimosi, specimens from the upper Nzoia River on the Guas Ngishu Plateau are clearly referable to typical *fumosa*.

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 15, p. 514, May; vol. 16, p. 360, October, 1915.

CROCIDURA RAINEYI Heller.

Plate 8, figs. 9, 10.

1912. *Crocidura raineyi* HELLER, Smithsonian Misc. Coll., vol. 60, No. 12, p. 7. November 4. (Mount Gargues, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Nine, as follows:

BRITISH EAST AFRICA: Mount Gargues, Mathews Range (Heller).

Though obviously a member of the *fumosa* group this distinct species is easily separated from all the subspecies of *fumosa* by its large size and large skull. Heller writes:[1]

> The species is confined to the extreme forested summit of Mount Garguez, which is isolated from the Kenia forest by low bush-covered desert in which no representative of the *fumosa* group is known to occur. *Fumosa* and its allies are all forest species known only from the highlands, with the exception of *schistacea* of the high veldt of the Athi Plains. On Mount Garguez this race was found from the lower edge of the forest at 5,000 feet to the summit, 7,000 feet.

CROCIDURA JACKSONI Thomas.

1904. *Crocidura jacksoni* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 14, p. 238. September. (Ravine Station, British East Africa; type in British Museum.)

Specimens.—Fourteen, from the following localities:

BRITISH EAST AFRICA: Isiola River, 1 (Heller); Kaimosi, 1 (Turner); Kapiti Plains, 1 (Loring); Mount Sagalla, 3 (Heller); Mtoto Andei, 1 (Heller); Neuman's Boma, Northern Guaso Nyiro, 1 (Heller); Southern Guaso Nyiro, 3 (Loring); Ulukenia Hills, 2 in alcohol (Loring); Voi, 1 (Heller).

A female, collected by Loring in the Southern Guaso Nyiro, June 30, contained three fetuses, and one collected by Heller at Voi, November 20, four. Most of the skins are in the ordinary brown coat, but some, showing the progress of the moult, are partly in the brown and partly in the darker slate-brown pelage. The Kaimosi specimen is very dark, almost blackish, and is marked by a silvery lustre as described in the type by Thomas. This specimen is really so very different from the rest of the series in color that I hesitate to call it the same form. Dollman has described a darker subspecies of *jacksoni* from the Amala River, Nyanza Province, British East Africa, as *Crocidura jacksoni amalæ*,[2] but this specimen does not agree with the description in many ways. It probably represents a color phase of *jacksoni* or perhaps a distinct species, but owing to the lack of authentic material of *jacksoni* for comparison I do not feel justified in separating it.

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[1] Smithsonian Misc. Coll., vol. 60, No. 12, p. 8, Nov. 4, 1912.

[2] Ann. and Mag. Nat. Hist., ser. 8, vol. 15, p. 516, May; vol. 16, p. 376, October, 1915.

Measurements of specimens of Crocidura jacksoni and C. hildegardeæ.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: Condylobasal length.	Maxillary breadth	Breadth of braincase.	Depth of braincase (median).	Mandible.	Upper tooth row (entire).	Condition of teeth.
C. jacksoni.												
B. E. A.:												
Isiola River	182575	Male	76	49	13.0	....	6.2	....	....	10.3	8.6	Little worn.
Neuman's Boma	182579	...do	85	59	14.0	20.6	6.5	9.5	5.0	10.8	8.8	Do.
Kapiti Plains	161692	...do	79	55	13.5	19.8	6.3	8.7	4.8	10.2	8.9	Do.
So. Guaso Nyiro	162045	...do	83	52	13.5	21.5	6.9	9.6	4.9	11.8	9.4	Much worn.
Do	162043	Female	84	50	13.0	20.5	6.8	9.7	4.8	10.9	9.3	Moderately worn.
Do	162044	...do	81	54	13.5	....	6.7	....	....	10.8	8.8	Do.
Voi	182508	...do	75	53	13.0	20.3	6.3	9.0	5.0	10.9	8.8	Do.
Mount Sagalla	182505	Male	85	55	13.5	21.2	6.6	9.3	5.2	11.2	9.1	Do.
Do	182507	...do	80	55	13.0	20.1	6.4	9.2	5.1	11.0	9.0	Do
Do	182502	Female	75	52	13.0	....	6.2	9.0	5.1	10.8	....	Do.
C. h. hildegardeæ.												
Uganda: Kabula Muliro	[1] 164639	Male	82	52	12.5	....	6.3	....	....	10.2	8.5	Do.
B. E. A.:												
Naivasha	161748	...do	77	45	13.0	18.7	5.9	8.4	5.0	10.0	8.1	Do.
Do	162047	...do	69	47	12.5	....	5.7	8.3	5.2	9.5	8.2	Do.
Kapiti Plains	161691	Female	70	49	12.0	....	6.1	8.4	4.6	10.0	8.6	Little worn.
Oljoro O Nyon	162042	Male	75	48	13.0	18.0	5.6	8.3	4.8	9.0	7.8	Do.
Engare Narok	162046	Female	68	51	13.0	....	....	8.4	4.8	9.3	....	Moderately worn.
Fort Hall	163948	Male	84	52	13.0	19.6	6.1	8.8	5.0	10.2	8.8	Little worn.
Wambugu	163957	...do	80	48	12.5	19.0	6.1	8.6	4.8	9.6	8.0	Moderately worn.
Do	163952	Female	79	56	13.0	18.7	5.7	8.5	4.9	9.5	7.9	Do.
Nyeri	163953	Male	79	51	13.5	18.3	5.9	8.3	4.8	9.3	7.9	Little worn.

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[1] Type of *Crocidura maanjæ* Heller.

Measurements of specimens of Crocidura jacksoni and C. hildegardeæ—Continued.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: Condylobasal length.	Maxillary breadth	Breadth of brain-case.	Depth of brain-case (median).	Mandible.	Upper tooth row (entire).	Condition of teeth.
C. h. hildegardeæ—Continued.												
B. E. A.—Continued.												
Nyeri	163954	Male	77	49	13.0	....	5.7	8.3	4.8	9.5	8.0	Little worn.
Do	163955	Female	75	47	12.5	17.5	5.4	....	....	9.3	7.7	Do.
Isiola River	182447	Male	76	44	13.0	19.2	6.0	9.2	4.7	9.8	8.2	Do.
Mount Lololokwi	182513	...do	70	....	12.0	18.5	5.9	8.6	5.0	9.7	8.3	Do.
Do	182514	...do	75	51	13.0	....	6.1	....	....	10.0	8.2	Moderately worn.
Do	182515	...do	70	49	12.5	19.0	5.8	8.8	4.7	9.9	8.4	Little worn.
Do	182518	...do	71	54	12.0	17.9	6.2	8.5	4.8	9.7	8.1	Moderately worn.
Do	[1] 181820	Female	72	51	12.5	19.3	6.1	8.7	4.8	10.3	8.5	Do.
Do	182512	...do	75	48	12.0	18.7	5.8	8.4	4.9	9.8	8.2	Little worn.
Do	182517	...do	70	50	12.0	18.5	6.0	8.8	4.8	9.5	8.2	Moderately worn.
Do	182519	...do	70	47	12.5	18.7	6.1	8.8	4.7	10.0	8.4	Little worn.
Do	182522	...do	72	52	12.5	19.6	6.1	8.6	4.8	10.2	8.6	Moderately worn.
Mount Gargues	182509	Male	78	53	13.0	19.3	6.2	8.6	4.8	10.3	8.4	Considerably worn
Do	182511	...do	71	55	13.0	19.1	6.1	9.0	5.1	10.0	8.6	Moderately worn.
Do	182510	Female	75	55	12.5	19.0	6.1	8.8	5.0	10.1	8.2	Do.
Mount Mbololo	182456	Male	75	53	13.0	18.7	6.2	8.5	5.0	10.1	8.3	Do.
Do	182457	...do	75	53	13.5	....	6.0	....	....	10.1	8.2	Do.
Do	182460	...do	75	53	13.0	19.3	6.2	8.6	5.1	10.2	8.6	Do.
Do	182523	...do	72	59	12.5	19.3	6.4	8.8	5.2	10.4	8.7	Little worn.
Do	[2] 181818	Female	70	52	13.0	18.6	6.1	8.8	4.8	9.9	7.9	Considerably worn.
Do	182459	...do	75	53	13.0	19.2	6.0	8.7	5.2	10.4	8.5	Moderately worn.
Mount Sagalla	182506	Male	72	45	12.0	18.8	5.8	8.5	4.7	9.9	8.2	Much worn.
Do	182503	Female	78	52	13.0	19.4	6.3	8.8	5.0	10.3	8.8	Moderately worn.
Do	182504	...do	78	45	12.0	19.2	6.2	8.5	4.9	10.2	8.6	Little worn.
Mount Umeng-	182501	Male	72	52	13.0	19.1	6.1	9.0	5.2	10.2	8.8	Moderately worn.

Mount Umengo	182524	Female	76	50	13.0	19.1	6.0	8.8	4.8	10.5	8.3	Moderately worn.
Voi	182499	Male	70	49	12.0	18.7	5.9	8.9	4.8	10.0	8.4	Do.
Ndi	182500	...do	70	48	12.5	....	5.9	8.7	4.9	10.2	8.4	Unworn.
G. E. A.:												
Mount Kilimanjaro	19732	Female	....	....	....	18.8	6.0	8.3	4.9	9.9	8.3	Little worn.
Do	19733	...do	....	....	12.5	18.9	6.2	8.8	5.0	10.5	8.7	Do.
C. h. altæ.												
B. E. A.:												
Mount Gargues	[3] 181819	Male	74	62	13.5	19.0	6.0	8.8	5.0	9.9	8.5	Do.
Do	182426	...do	75	64	13.0	19.4	6.1	9.0	4.8	10.0	8.6	Moderately worn.
Do	182427	...do	72	67	14.0	19.4	6.0	9.1	5.1	10.3	8.7	Do.
Do	182430	...do	80	65	14.0	19.7	6.1	8.9	5.1	10.4	8.5	Do.
Do	182428	Female	70	63	13.5	....	6.0	....	....	10.2	8.7	Do.
Do	182429	...do	75	56	13.0	18.3	5.9	8.7	4.9	9.5	8.2	Do.

[1] Type of *Crocidura hildegardeæ procera* Heller. [2] Type of *Crocidura lutreola* Heller. [3] Type.

I am unable satisfactorily to separate this species into forms over all the range, as represented by the specimens listed above. There is considerable variation in the color and the skull but all the specimens are distinctly larger than *hildegardeæ*, and there is never any confusion with that species. Dollman placed Osgood's *Crocidura parvipes*, *C. xantippe*, and Heller's *C. lutreola* in the "*jacksoni*" group. The first two species I consider to be small members of the *hindei-fischeri* group, and *lutreola* does not seem to differ sufficiently from *hildegardeæ* to be recognized as a subspecies of that form. The three specimens listed above from Mount Sagalla were referred by Heller[1] to *Crocidura parvipes*, but comparison with the type of that species shows them to be not of the same species, and I do not find any way to distinguish them from *jacksoni*.

Dollman further recognized *Crocidura gracilipes* Peters as a species of the *jacksoni* group and listed under it specimens in the British Museum from Taveta and Rombo, Kilimanjaro. The Taveta specimens in the United States National Museum collection seem indistinguishable from *Crocidura hildegardeæ*, and under that species I have placed some notes on the type-specimen of *gracilipes*, made at Berlin by Mr. Heller.

For measurements see table, page 61.

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[1] Smithsonian Misc. Coll., vol. 60, No. 12, p. 9. Nov. 4, 1912.

CROCIDURA HILDEGARDEÆ HILDEGARDEÆ Thomas.

Plate 8, figs. 11, 12, 13, 14, 15, 16.

1892. *Crocidura* sp. True, Proc. U. S. Nat. Mus., vol. 15, p. 470. (Kilimanjaro.)
1904. *Crocidura hildegardeæ* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 14, p. 240. September. (Fort Hall, British East Africa; type in British Museum.)
1910. *Crocidura maanjæ* Heller, Smithsonian Misc. Coll., vol. 56, No. 15, p. 4. December 23. (Kabula Muliro, Uganda; type in U. S. Nat. Mus.)
1912. *Crocidura lutreola* Heller, Smithsonian Misc. Coll., vol. 60, No. 12, p. 8. November 4. (Mt. Mbololo, Taita Hills, British East Africa; type in U. S. Nat. Mus.)
1912. *Crocidura hildegardeæ procera* Heller, Smithsonian Misc. Coll., vol. 60, No. 12, p. 10. November 4. (Mt. Lololokwi, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Fifty-three, from the following localities:

Uganda: Kabula Muliro, 1 (Loring).

British East Africa: Engare Narok River, 1 (Loring); Fort Hall, 1 (Loring); Isiola River, 1 (Heller); Kapiti Plains, 2 (Loring); Mayo River, Laikipia, 1 (Heller); Meru, 2 in alcohol (Heller); Mount Gargues, 3 (Heller); Mount Kenia, 1 in alcohol (Loring); Mount Lololokwi, 12 (Heller); Mount Mbololo, 8 (Heller); Mount Sagalla, 3 (Heller); Mount Umengo, 2 (Heller); Naivasha Station, 2 (Loring); Ndi, 1 (Heller); Nyeri, 4 (Loring); Oljoro O Nyon River, 1 (Heller); Voi, 1 (Heller); Wambugu, 4 (Loring).

German East Africa: Mount Kilimanjaro, 2 (Abbott).

This species appears to range over a much wider territory than has been supposed. I am unable to separate subspecies from Uganda or from the Taita Hills and Mount Kilmanjaro region of extreme southeastern British East Africa. After long study of our excellent series of specimens the forms described as *maanjæ*, *procera*, and *lutreola* all seem indistinguishable from typical *hildegardeæ*. The accompanying table of measurements shows how absolutely wanting is geographical variation in size, and the range of color within a series from a single region frequently covers virtually the entire range of coloration for the species. On the forested summit of Mount Gargues is a well-marked race with decidedly dark coloration and long tail, but the specimens from the lower juniper slopes of the same mountain are best referred to true *hildegardeæ*.

The following records of embryos are from specimens prepared by Heller: Mount Mbololo, November 4, three, November 8, three; Mount Umengo, November 13, four; Mount Sagalla, November 18, two with three each.

None of the earlier names for species of *Crocidura* from the Kilimanjaro region southward appear to apply to this species. The type-specimen of *Crocidura gracilipes* Peters[1] was examined by

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[1] Monatsb. Kön. Akad. Wiss. Berlin, 1870, p. 590. July.

Heller in Berlin and the following manuscript notes made by him are of interest:

Crocidura gracilipes Peters. Type alcoholic, skull extracted; No. 3905, Kilimanjaro, v. der Decken. Tail without longer hairs as in *Sylvisorex*, but it is a true *Crocidura*, as no 4th upper unicuspid is present, but there is some space between 3rd unicuspid and large premolar; middle unicuspid about same size as last. Tail, 52 mm., foot 12.2; specimen much shrunken by strong alcohol. Color above mummy brown, below silver brown. Skull: Condyloincisive length, 20.5; breadth braincase, 8.5; length upper tooth row, 8.7; manidble, condyloincisive length, 14.9. Not closely related to any British East African form except perhaps to the *maurisca* group.

CROCIDURA HILDEGARDEÆ ALTÆ Heller.

Plate 10, figs. 1, 2.

1912. *Crocidura hildegardeæ altæ* Heller, Smithsonian Misc. Coll., vol. 60, No. 12, p. 9. November 4. (North Creek, at 6,000 feet, Mt. Gargues, Mathews Range, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Six, from—

British East Africa: Mount Gargues (Heller).

This well-marked race of *hildegardeæ* is apparently confined to the forested summit of Mount Gargues, from 5,000 to 6,000 feet altitude.

Dollman placed *Crocidura planiceps* Heller in this group, as a close relative of *hildegardeæ*. It is a member of the *bicolor* group, related to *C. b. elgonius* Osgood.

For measurements of specimens of the subspecies of *C. hildegardeæ* see table, pages 61–63.

CROCIDURA BICOLOR ELGONIUS Osgood.

1910. *Crocidura bicolor elgonius* Osgood, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 369. April. (Kirui, near Mount Elgon, British East Africa; type in British Museum.)

1910. *Crocidura bicolor elgonius* Roosevelt, African Game Trails, Amer. ed., p. 474; London ed., p. 486.

Specimens.—Nine, from the following localities:

British East Africa: Kaimosi, 6 (Heller); Kapiti Plains, 1 (Loring); Kisumu, 1 (Heller); Lukosa River, 1 (Heller).

Loring notes of a female, collected on the Kapiti Plains, May 1, that the mammæ were 3–3 inguinal. Heller found three embryos in a female collected at Kaimosi, January 24, and one embryo in one taken at the same place January 29. The specimen from Kapiti Plains does not differ in any characters from the specimens taken near Victoria Nyanza.

Measurements of shrews of the bicolor-allex group.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: Condylobasal length.	Maxillary breadth	Breadth of braincase.	Depth of braincase (median).	Mandible.	Upper tooth row (entire).	Condition of teeth.
C. b. elgonius.												
B. E. A.:												
Kisumu	182439	Male	56	38	10.0	16.0	4.8	7.3	4.3	8.1	6.9	Unworn.
Lukosa River	182438	...do	61	40	10.0		5.1			8.2	7.0	Do.
Kaimosi	182432	...do	60	35	10.0	15.8	4.7	7.3	3.9	8.2	6.9	Little worn.
Do	182434	...do	65	39	9.8	15.8	5.0	7.2	4.2	8.1	6.8	Moderately worn.
Do	182435	...do	61	39	10.4	16.5	5.1	7.5	4.2	8.1	7.2	Unworn.
Do	182437	...do	62	43	10.1	15.5	4.8	7.0	3.8	8.1	6.7	Do.
Do	182433	Female	55	40	9.5	15.0	4.6			7.8	6.7	Little worn.
Kapiti Plains	161693	...do	64	38	9.6	15.6	4.9	7.3	3.8	7.8	6.8	Moderately worn.
C. b. planiceps.												
Lado:												
Rhino Camp	[1] 164641	Male	71	53	12.3	17.7	5.1	7.7	4.3	8.9	7.8	Little worn.
Do	164862	...do	73	52	11.7		5.2			9.1	7.7	Considerably worn.
Do	164863	...do	62	50	11.5	17.0	5.1	7.5	4.3	8.8	7.3	Moderately worn.
Do	164865	...do	69	49	12.0	16.5	5.0	7.5	4.2	8.5	7.4	Unworn.
Do	164864	Female	63	51	11.0	16.4	5.0	7.4	4.2	8.4	7.3	Do.
Uganda: Hoima	164901	Male	67	47	10.9	16.8	5.2	7.6	4.3	8.4	7.3	Moderately worn.
C. allex.												
B. E. A.:												
Naivasha	[2] 16820	Male	64	45	11.0	16.7	5.1	7.7	4.6	8.5	7.2	Moderately worn.
Do	162049	...do	65	39	11.0	16.3	5.0	7.7	4.5	7.9	7.1	Little worn.
Do	162051	...do	62	43	11.3	16.7	5.0	7.4	4.4	8.5	7.3	Do.
Do	162053	...do	66	43	11.2	16.0	5.2	7.7	4.7	8.2	7.0	Do.
Do	162052	Female	64	41	11.0	15.6	5.0	7.4	4.4	7.7	6.7	Moderately worn.
Oljoro O Nyon	162041	...do	65	45	11.3	16.8	5.5	7.9	4.6	8.8	7.5	Do.
Aberdare Mountains	182431	Male	60	41	11.0	16.1	4.8	7.7	4.7	8.0	7.0	Do.

C. a. alpina.

B. E. A.:											
Mount Kenia	163966	Male	61	38	11.6	15.7	5.1	7.7	4.4	8.0	7.1	Little worn.
Do.	163971	do	57	37	11.0	15.2	4.8	7.4	4.4	7.6	6.8	Do.
Do.	163972	do	62	34	11.0	15.5	4.9	7.4	4.3	7.7	7.0	Moderately worn.
Do.	163973	do	59	37	11.1	.....	4.8	7.4	4.3	7.5	6.8	Little worn.
Do.	[1] 163069	Female	65	39	10.6	15.7	4.8	7.5	4.2	7.9	6.9	Do.
Do.	163962	do	60	38	11.0	15.5	4.8	7.4	4.4	7.7	6.7	Do.
Do.	163963	do	66	39	10.8	15.7	4.8	.....	.....	7.8	6.9	Moderately worn.
Do.	163964	do	60	37	10.4	15.4	4.8	7.5	4.3	7.6	6.8	Little worn.
Do.	163965	do	60	36	10.3	15.0	4.7	7.4	4.3	7.8	6.7	Do.
Do.	163968	do	63	36	11.0	15.9	4.9	7.7	4.3	.....	7.1	Do.

[1] Type.

[2] Field Mus. Nat. Hist.; type.

CROCIDURA BICOLOR PLANICEPS Heller.

Plate 10, figs. 3, 4.

1910. *Crocidura planiceps* HELLER, Smithsonian Misc. Coll., vol. 56, No. 15, p. 5. December 23. (Rhino Camp, Lado Enclave; type in U. S. Nat. Mus.)

Specimens.—Seven, from the following localities:

LADO: Rhino Camp, 6, including one in alcohol (Loring).

UGANDA: Hoima, 1 (Loring).

This shrew shows close relationship with *C. b. elgonius*, and is chiefly distinguished by its slightly larger size and longer tail. The specimen from Hoima, Uganda, appears somewhat intermediate, though plainly belonging best with *planiceps*. There is a remarkable variation in the relative size of the second and third upper unicuspids in this form.

For measurements see page 66.

CROCIDURA ALLEX ALLEX Osgood.

1910. *Crocidura allex* OSGOOD, Field Mus., Zool. Ser., vol. 10, No. 3, p. 20. April 7. (Naivasha, British East Africa; type in Field Mus. Nat. Hist.)

1910. *Crocidura allex* ROOSEVELT, African Game Trails, Amer. ed., p. 480; London ed., p. 491.

Specimens.—Twelve, from the following localities:

BRITISH EAST AFRICA: Aberdare Range, 2 (Heller); Naivasha Station, 9, including 3 in alcohol (Loring); Oljoro O Nyon River, 1 (Heller).

The specimens from the summit of the Aberdare Range are decidedly intermediate in characters between *allex* and *alpina*, but on the whole go best with the Naivasha specimens of *allex*.

CROCIDURA ALLEX ALPINA Heller.

Plate 10, figs. 5, 6.

1910. *Crocidura alpina* HELLER, Smithsonian Misc. Coll., vol. 56, No. 9, p. 5. July 22. (West slope of Mt. Kenia at 10,000 feet, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Twenty-two, including seven in alcohol, from—

BRITISH EAST AFRICA: Mt. Kenia (Loring, Mearns).

This brown pygmy shrew is related to the Naivasha *allex* and the two forms are externally very much alike. The Kenia form has a slightly smaller skull and noticeably smaller first upper unicuspid tooth. Mearns found four fetuses in a female collected September 29 at 10,000 feet altitude. Heller states:[1]

> The range of this species extends from 10,000 to 13,000 feet—that is, from the upper limit of the bamboo forest to the lower part of the giant *Senecio* zone. Through most of this extent it is associated with the giant Crocidura, *C. nyansæ*, attaining, however, a somewhat higher altitude than this species.

Through an unfortunate accident in the photograph studio, the type skull of *Crocidura alpina* was badly damaged after the pictures shown on Plate 10 were made.

For measurements see page 67.

CROCIDURA ROOSEVELTI (Heller).

Plate 9.

1910. *Heliosorex roosevelti* HELLER, Smithsonian Misc. Coll., vol. 56, No. 15, p. 6. December 23. (Rhino Camp, Lado Enclave; type in U. S. Nat. Mus.)

Specimen.—One, from—

LADO: Rhino Camp (Loring).

Externally this unique type-specimen resembles greatly certain specimens of *Crocidura hildegardeæ*, but its long tail and peculiar skull and teeth readily distinguish it. The small size of the claws and the elongated occiput are so closely approached in other species that they become purely relative characters and can hardly be considered generic. An even better specific character is found in the last upper unicuspid. This tooth in *C. roosevelti* differs from all African species of *Crocidura* which I have seen in the relatively large size of the cone and small cingulum shelves, especially the exterior. The difference is almost exactly that between two common European species, *C. russula* and *C. leucodon*, though somewhat more pronounced in the African species.

CROCIDURA MAURISCA Thomas.

1904. *Crocidura maurisca* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 14, p. 239. September. (Entebbe, Uganda; type in British Museum.)

Specimens.—Twenty-three, including 12 in alcohol, from—

BRITISH EAST AFRICA: Kaimosi (Heller).

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[1] Smithsonian Misc. Coll., vol. 56, No. 9, p. 5. July 22, 1910.

Measurements of specimens of Crocidura maurisca and C. littoralis.

Species and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: Condylobasal length.	Maxillary breadth.	Breadth of braincase.	Depth of braincase (median).	Mandible.	Upper tooth row (entire).	Condition of teeth.
C. maurisca.												
B. E. A.: Kaimosi	182535	Male	92	63	16.0	21.2	6.5	....	5.8	11.4	9.4	Little worn.
Do	182545	...do	95	73	16.5	22.2	6.4	9.8	5.4	11.7	9.9	Unworn.
Do	182546	...do	94	66	16.5	21.5	6.6	9.7	5.5	11.2	9.7	Do.
Do	182547	...do	85	64	15.5	21.3	6.4	9.3	5.4	11.3	9.4	Little worn.
Do	182532	Female	90	55	14.5	20.7	6.4	9.6	5.4	11.2	9.1	Do.
Do	182536	...do	82	66	15.5	21.0	6.3	9.3	5.4	11.1	9.3	Moderately worn.
Do	182542	...do	85	60	15.5	20.1	6.2	9.3	....	10.9	9.2	Do.
C. littoralis.												
Uganda: Butiaba	[1]164642	Male	96	67	16.5	22.6	6.4	9.9	5.9	11.9	10.0	Do.

[1] Type.

CROCIDURA LITTORALIS Heller.

Plate 10, figs. 7, 8.

1910. *Crocidura littoralis* HELLER, Smithsonian Misc. Coll., vol. 56, No. 15, p. 5. December 23. (Butiaba, Uganda; type in U. S. Nat. Mus.)

Specimen.—One, the type:

UGANDA: Butiaba (Loring).

The single specimen of this form examined indicates a shrew very closely related to *Crocidura maurisca.* The few trifling differences between the two make it seem probable that they intergrade. Larger series may even prove the two indistinguishable. No specimen in our small series of *maurisca,* however, is quite so large or so richly colored as is the type of *littoralis.*

For measurements see table, page 69.

Order CHIROPTERA.

Family PTEROPIDÆ.

Genus ROUSETTUS Gray.

1821. *Rousettus* GRAY, London Med. Rep., vol. 15, p. 299. April 1. (*R. ægyptiacus.*)

1912. *Lissonycteris* ANDERSEN, Cat. Chir. Brit. Mus., ed. 2, vol. 1, p. 23. March 23. [Subgenus.] (*R. angolensis.*)

Several species of this genus have recently been added to the list of East African fruit bats, but only one form is represented in our collections.

ROUSETTUS ANGOLENSIS (Bocage).

1898. *Cynonycteris angolensis* BOCAGE, Journ. Sci., Math., Phys. Nat., Acad. Sci. Lisboa, ser. 2, vol. 5, p. 133. (Pungo Andongo, Angola; cotypes in Museu Bocage, Lisbon, and British Museum.)

1910. *Rousettus angolensis* THOMAS AND WROUGHTON, Trans. Zool. Soc. London, vol. 19, p. 487. March.

Specimen.—One, from—

UGANDA: Mobuku Valley, East Ruwenzori (Dent).

"Very plentiful in the lower valleys of Ruwenzori, but not seen above 6,500 feet. Native name Bihukusi."[1]

Genus EIDOLON Rafinesque.

1815. *Eidolon* RAFINESQUE, Anal. Nat., p. 54. (*E. helvum.*)

1861. *Pterocyon* PETERS, Mon.-ber. K. Preuss. Akad. Wiss. Berlin, p. 423. (*E. helvum.*)

This genus of fruit bats is widely spread over middle Africa, but no specimens were collected by members of the Smithsonian expeditions.

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[1] Woosnam, Trans. Zool. Soc. London, vol. 19, p. 487, March, 1910.

EIDOLON HELVUM (Kerr).

1792. *Vesp[ertilio] vampyrus helvus* KERR, Anim. Kingd., p. 91. (Senegal.)
1907. *Pterocyon helvus* ANDERSEN, Ann. and Mag. Nat. Hist., ser. 7, vol. 19, p. 504. June. (Fixes type locality; type-specimen said to have been "originally in Museum Leverianum; has probably been lost.")

Specimen.—One in alcohol, from—
ZANZIBAR: Zanzibar (Weddell).

Genus EPOMOPHORUS Bennett.

1836. *Epomophorus* BENNETT, Proc. Zool. Soc. London, 1835, p. 149. February 12. (*E. gambianus.*)

Three species, of the five known from the limits of this list, are included in the collection. The two desiderata are *Epomophorus gambianus* and *E. labiatus*, both of which have been recorded from Abyssinia.

EPOMOPHORUS WAHLBERGI HALDEMANI (Hallowell).

1846. *Pteropus haldemani* HALLOWELL, Proc. Acad. Nat. Sci. Philadelphia, vol. 3, p. 52. (West Africa; type in Acad. Nat. Sci. Philadelphia.)

Specimens.—Two, from the following localities:
BRITISH EAST AFRICA: Taita Hills, 1 (Heller).
ZANZIBAR: Zanzibar, 1 in alcohol (Weddell).

EPOMOPHORUS MINOR Dobson.

1880. *Epomophorus minor* DOBSON, Proc. Zool. Soc. London, 1879, p. 715. April. (Zanzibar; type in British Museum.)

Specimen.—One in alcohol, from—
ZANZIBAR: Zanzibar (received from Dr. G. E. Dobson).

EPOMOPHORUS ANURUS Heuglin.

1864. *Epomophorus anurus* HEUGLIN, Nov. Act. Acad. Caes. Leop., vol. 31, part 7 p. 12. (Bongo, Bahr-el-Ghazal, Sudan; cotypes in R. Nat. Hist. Museum, Stuttgart.)

Specimens.—Seventeen, including 8 in alcohol, from—
UGANDA: Kampala (Loring, Mearns).

Doctor Mearns's notes show that these specimens were found clinging to the straw roof of the museum building at Kampala.

Family RHINOPOMIDÆ.

Genus RHINOPOMA Geoffroy.

1813. *Rhinopoma* GEOFFROY, Descr. l'Égypte, vol. 2, p. 113. (*R. microphyllum.*)
1816. *Rhinopoma* OKEN, Lehrb. Nat., 3ter Theil, 2te Abth., p. 926. (*R. microphyllum.*)

In this instance, and throughout this list in other cases where there is occasion to cite Geoffroy in volume two of "Description de l'Égypte," I have followed Palmer[1] in dating that work from 1813. Sherborn,[2] Lyon,[3] and others have brought forward considerable evidence to prove that Geoffroy's work was not actually published until 1818, but this evidence can hardly be accepted as conclusive. When specific names of long standing, based on type-specimens from known localities, as well as several generic names, are affected by the change of reference, it seems best to require absolute proof to discredit the date of publication of a work like the "Description de l'Égypte." If such proof is ever discovered, *Rhinopoma* and other generic and specific names will date from Oken, 1816, as cited above.

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[1] North Amer. Fauna, No. 23, p. 17. January 23, 1904.
[2] Proc. Zool. Soc. London, 1897, pp. 287-288. 1897.
[3] Proc. Biol. Soc. Washington, vol. 27, pp. 217-218. Oct. 31, 1914.

RHINOPOMA CYSTOPS Thomas.

1903. *Rhinopoma cystops* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 11, p. 496. May. (Luxor, Lower Egypt; type in British Museum.)

Specimen.—One in alcohol from—

Sudan: Shendi (Rothschild).

Family EMBALLONURIDÆ.

Genus COLEURA Peters.

1867. *Coleura* Peters, Mon.-ber. K. Preuss. Akad. Wiss. Berlin, p. 479. (*C. afra.*)

Only one of the two known continental species of this genus of bats is included in our East African collections. The unrepresented species, *C. gallarum* Thomas, is of doubtful validity, probably at the most only a northern race of *Coleura afra.* The old record of a Seychelle Island species at Zanzibar has been questioned by Thomas.[1]

COLEURA AFRA (Peters).

1852. *Emballonura afra* Peters, Reise Mossambique, Säug., p. 51. (Mozambique; type in Berlin Museum.)

Specimen.—One from—

British East Africa: Voi (Heller).

Some measurements from this specimen are: Head and body, 65; tail, 17; foot, 11; ear, 17; forearm, 48. Skull: Condylobasal length, without premaxillary bones, 15.8; greatest length, 17.4; zygomatic breadth, 10.4; upper tooth row, entire, 7. The specimen is an old female, with the teeth considerably worn.

Genus TAPHOZOUS Geoffroy.

1813. *Taphozous* Geoffroy, Desc. l'Égypte, vol. 2, p. 113. (*T. perforatus.*)

1816. *Taphozous* Oken, Lehrb. Nat., 3ter Theil, 2te Abth., p. 926. (*T. aegyptiacus*=*T. perforatus.*)

Bats of this genus seem to be rare or difficult to obtain in East Africa, as only a single specimen was collected on each of the larger expeditions.

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 15, p. 578. June, 1915.

TAPHOZOUS MAURITIANUS Geoffroy.

1813. *Taphozous mauritianus* GEOFFROY, Descr. l'Égypte, vol. 2, p. 127. (Mauritius.)

1816. *T[aphozous] mauritianus* OKEN, Lehrb. Nat., 3ter Theil, 2te Abth., p. 927.

Specimens.—Two, as follows:

LADO: Rhino Camp, 1 in alcohol (Mearns).

BRITISH EAST AFRICA: Kisumu, 1 (Heller).

TAPHOZOUS PERFORATUS Geoffroy.

1813. *Taphozous perforatus* GEOFFROY, Descr. l'Égypte, vol. 2, p. 126. (Ombos and Thebes, Egypt; type in Paris Museum.)

1816. *T[aphozous] aegyptiacus* OKEN, Lehrb. Nat., 3ter Theil, 2te Abth., p. 927. (New name for *T. perforatus*.)

Specimen.—One in alcohol from—

SUDAN: Shendi (Rothschild).

Family PETALIIDÆ.

Genus PETALIA Gray.

1838. *Petalia* GRAY, Mag. Zool. and Bot., vol. 2, p. 494. (*P. javanica*.)

About 10 species and subspecies of wrinkle-nosed bats are known to occur in equatorial East Africa. Six forms are represented in our collection. No specimens of any member of the widely spread *Petalia thebaica* group were collected by either the Smithsonian or Rainey expeditions.

For measurements of specimens see table, pages 75–76.

PETALIA ARGE (Thomas).

1903. *Nycteris arge* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 12, p. 633. December. (Efulen, Cameroons; type in British Museum.)

Specimen.—One from—

BRITISH EAST AFRICA: Yala River (Turner).

This species, new to the fauna of British East Africa, has not previously been recorded from any locality east of the Semliki River. The specimen collected by Mr. Turner east of Victoria Nyanza, on the Yala (Lukosa) River, is therefore of special interest.

PETALIA NANA Andersen.

1912. *Petalia nana* ANDERSEN, Ann. and Mag. Nat. Hist., ser. 8, vol. 10, p. 547. November. (Benito River, French Congo; type in British Museum.)

Specimens.—Two, as follows:

BRITISH EAST AFRICA: Yala River (Turner).

These specimens record the extension of the known range of a second member of the "*javanica* group"[1] to British East Africa.

They agree in all details with the description of the type-specimen from west Africa.

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[1] Andersen, Ann. and Mag. Nat. Hist., ser. 8, vol. 10, p. 549. November.

PETALIA HISPIDA (Schreber).

1774. *Vespertilio hispidus* SCHREBER, Säugth., pl. 56. (Senegal.)

Specimens.—Thirteen, from the following localities:

SUDAN: Bor, 8, including 6 in alcohol (Heller).

BRITISH EAST AFRICA: Nairobi, 1 (Mearns); Tana River, 4, including 3 in alcohol and 1 skeleton (Chanler).

PETALIA AURITA Andersen.

1893. *Nycteris hispida* TRUE, Proc. U. S. Nat. Mus., vol. 16, p. 602. (Not of Schreber.)

1912. *Petalia aurita* ANDERSEN, Ann. and Mag. Nat. Hist., ser. 8, vol. 10, p. 547. (Kilifi, British East Africa; type in British Museum.)

Specimens.—Two in alcohol, as follows:

BRITISH EAST AFRICA: Marsabit Road, 1 (Heller); Tana River, 1 (Chanler).

PETALIA ÆTHIOPICA ÆTHIOPICA (Dobson).

1878. *Nycteris æthiopica* DOBSON, Cat. Chir. Brit. Mus., p. 165. (Kordofan, Sudan; type in British Museum.)

Specimens.—Two (one in alcohol) from:

UGANDA: Gondokoro (Loring).

PETALIA ÆTHIOPICA LUTEOLA (Thomas).

1901. *Nycteris æthiopica luteola* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 8, p. 30. July. (Kitui, British East Africa; type in British Museum.)

Specimens.—Three, from—

BRITISH EAST AFRICA: Mazeras (Heller).

These specimens are all adult females, taken on December 27. Two were pregnant with one large embryo each.

For measurements of specimens of the subspecies of *Petalia æthiopica* see table, page 76.

True[1] lists four alcoholic specimens of "*Nycteris thebaica*" collected by Dr. W. L. Abbott on Kilimanjaro. These specimens can not now be found, but are doubtless mislaid in the collection.

There is an unfortunate and wholly avoidable confusion regarding the generic name for the group of bats here called *Petalia*. Although Mr. Gerrit S. Miller long ago called attention to the fact that *Nycteris* Geoffroy and Cuvier, 1803, is preoccupied by *Nycteris* Borkhausen, 1797, and is properly used only for a genus of American Vespertilionidæ,[2] some authors insist upon retaining it, contrary to the provisions of the International Code, for the old-world group. Such disregard for established rules is even encouraged by a member of the International Commission, who in a recent paper uses *Nycteris* in place of *Petalia*.[3]

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[1] Proc. U. S. Nat. Mus., vol. 15, p. 469, 1892.

[2] Proc. Biol. Soc. Washington, vol. 22, p. 90. April 17, 1909.

[3] J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 37, pp. 425–427. September 29, 1917.

Measurements of Specimens of Petalia.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Ear from inner margin.	Forearm.	Skull: Condylo-basal length.	Zygomatic breadth.	Postorbital breadth.	Mandible.	Upper tooth row, including canine.	Observations.
P. arge.												
B. E. A.: Yala River	197956	Female	53	65	24.7	44.3	17.6	11.0	5.4	12.9	6.7	Teeth moderately worn.
P. nana.												
B. E. A.:												
Yala River	197957	...do	42	42	16.2	36.0	13.9	9.5	4.4	10.7	5.4	Do.
Do	197958	Male	42	44	17.7	35.1	13.8	9.3	4.0	10.2	5.3	Do.
P. hispida.												
Sudan:												
Bor	164967	...do	51	46	17.3	39.7	14.5	10.5	5.3	11.0	5.5	Teeth much worn.
Do	164968	Female	58	49	17.7	41.7	....	10.3	4.8	11.0	5.6	Teeth little worn.
Do	166511	Male	46	45	19.0	38.1	13.8	9.7	4.8	10.2	5.4	Teeth moderately worn.
Do	166512	...do	41	48	16.2	38.3	14.2	10.0	4.8	10.6	5.4	Do.
Do	166514	...do	46	44	17.5	39.5	14.5	10.0	5.2	10.7	5.6	Do.
Do	166510	Female	48	46	18.5	41.8	....	10.2	4.8	11.4	5.8	Do.
Do	166513	...do	49	49	17.5	41.8	14.9	9.8	4.5	11.0	5.6	Do.
Do	166515	...do	45	45	16.8	41.0	14.4	9.8	4.9	10.6	5.6	Do.
B. E. A.:												
Nairobi	166517	Male	49	40	18.0	39.8	14.5	10.2	4.6	10.6	5.7	Do.
Tana River	21020	...do	44	49	19.1	40.2	14.2	10.3	4.7	10.9	5.6	Teeth little worn.
Do	21021	...do	42	40	19.5	38.0	13.9	9.8	5.0	10.4	5.7	Do.
Do	21019	Female	45	52	19.5	40.8	14.5	10.3	4.7	10.6	5.8	Do.
P. aurita.												
B. E. A.:												
Marsabit Road	184320	Male	44	47	21.0	40.0	15.4	10.3	5.2	11.5	6.0	Teeth moderately worn.
Tana River	21023	Female	47	52	22.0	40.8	15.8	10.2	5.2	11.6	6.3	Teeth little worn.

Measurements of specimens of Petalia—Continued.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Ear from inner margin.	Forearm.	Skull: Condylobasal length.	Zygomatic breadth.	Postorbital breadth.	Mandible.	Upper tooth row, including canine.	Observations.
P. æ. æthiopica.												
Uganda:												
Gondokoro	166516	Male	61	58	26.5	48.0	......	......	......	......	......	Alcoholic.
Do	164969	..do	......	......	22.6	......	17.8	11.8	5.4	13.2	7.1	Teeth moderately worn.
P. æ. luteola.												
B. E. A.:												
Mazeras	182656	Female	60	50	24.8	50.5	17.8	11.9	5.7	13.6	7.1	Do.
Do	182657	..do	65	54	26.6	50.2	18.3	12.7	6.0	14.4	7.5	Teeth unworn.
Do	182658	..do	63	53	24.7	48.8	18.0	12.0	5.4	13.9	7.4	Do.

Family MEGADERMIDÆ.

Genus LAVIA Gray.

1838. *Lavia* Gray, Mag. Zool. and Bot., vol. 2, p. 490. (*L. frons*.)

The yellow-winged bat is well represented in the collection by numerous specimens from many localities. Two subspecies are included in the series, a small northern and a large southern race. Andersen and Wroughton,[1] recognizing these two subspecies, have placed the name *Lavia rex*, previously bestowed by Miller on the large East African race, in the synonymy of the West African *L. frons*, and have described as new the small race from the upper Nile. At the same time they admit that both a small and a large form inhabit West Africa. Until better series of specimens, somewhat comparable to the excellent suite now available from East Africa, are brought together from West and Central Africa, this arbitrary action by Andersen and Wroughton seems entirely unjustified. I have here recognized the two East African forms as distinct from the West African races. They occupy definite areas without overlapping, whereas the West African forms would appear to range together. If either or both the East African races prove to be identical with West African forms, it would seem reasonable to assume that Miller, as "first reviser," had restricted the original name *frons* to the small West African race. In that case *Lavia frons affinis* might become synonymous with *Lavia frons frons*.

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[1] Ann. and Mag. Nat. Hist., ser. 7, vol. 19, pp. 138-140. February, 1907.

LAVIA FRONS REX Miller.

Plate 10, figs. 9, 10.

1892. *Megaderma frons* TRUE, Proc. U. S. Nat. Mus., vol. 15, p. 469. Oct. 26. (Taveta. Not of Geoffroy.)

1905. *Lavia rex* MILLER, Proc. Biol. Soc. Washington, vol. 18, p. 227. Dec. 9. (Taveta, British East Africa; type in U. S. Nat. Mus.)

1907. *Lavia frons frons* ANDERSEN AND WROUGHTON, Ann. and Mag. Nat. Hist., ser. 7, vol. 19, p. 138. February. (Part; not of Geoffroy.)

1910. *Lavia frons* ROOSEVELT, African Game Trails, Amer. ed., pp. 474, 480, and 487 (part); London ed., pp. 486, 492, and 498 (part). (Not of Geoffroy.)

Specimens.—Thirty-seven, from the following localities:

BRITISH EAST AFRICA: Athi Station, 1 in alcohol (Loring); Kisumu, 6 (Heller); Machakos Road, 1 (Medlicott); Southern Guaso Nyiro, 21, including 9 in alcohol (Loring, Mearns, Heller); Taveta, 2, including 1, the type, in alcohol (Abbott); Telek River, Sotik, 3 (Heller); Ulukenia Hills, 3 in alcohol (Loring).

This subspecies differs from *Lavia frons affinis* of the upper Nile and Abyssinia in its generally more robust size. The forearm and ear average longer and the skull is conspicuously larger. Specimens from the vicinity of Victoria Nyanza and north to Lado are clearly intermediate between the two subspecies, but the small size of skull makes them go best with *affinis*. The length of the forearm seems to be the least reliable character to distinguish the races, and the size of skull and teeth the most satisfactory.

Heller and Loring, in the Appendix to Roosevelt's African Game Trails, have the following notes on the yellow-winged bat:

> Almost diurnal, flies well by day; hangs from the thorn-tree branches in the sunlight, and flies as soon as it sees a man approaching. One young, which remains attached to the mother until it is more than half her size. (Heller.)
>
> These large semidiurnal bats lived in the thorn-tree groves and thick bush along the Athi, South Guaso Nyero, and Nile Rivers, where we found them more or less common, and at the latter place abundant. At the first two named places they were almost always found in pairs hanging from the thorn trees by their feet, their wings folded before their faces. When disturbed they fly a short distance and alight, but when we returned to the spot a few minutes later they would often be found in the same tree from which they had been started. On the Nile, at Rhino Camp, and in suitable places all along the trail between Kampala and Butiaba, it was not unusual to find three and four in a single thorn tree. On dark days, and once in the bright sunlight, I saw these bats flying about and feeding. At evening they always appeared an hour or so before the sun went down. Their method of feeding was quite similar to that of our fly-catching birds. They would dart from the branches of a thorn tree, catch an insect, then return and hang head downward in the tree while they ate the morsel. One was captured with a young one clinging to it head downward, its feet clasped about its mother's neck. (Loring.)

Measurements of specimens of Lavia from East Africa.

Form and locality.	No.	Sex.	Head and body.	Ear from notch, dry.	Forearm.	Skull: Greatest length, including incisors.	Condylo-basal length.	Zygomatic breadth.	Entire upper tooth row.	Condition of teeth.
L. f. rex.										
B. E. A.:										
Taveta	18992			40.3						
Do	[1] 182993	Male			60.8				9.7	Moderately worn.
Machakos Road	162089	do		41.0	57.0					
Telek River	181480	do	75	42.3	59.6	24.7			9.1	Little worn.
Do	181481	Female	75	41.4	59.0	25.2	21.8	15.2	9.3	Considerably worn.
So. Guaso Nyiro	162077	Male	75	40.3	59.6	24.9		15.0	9.3	Moderately worn.
Do	162079	do	81	40.8	63.3	25.7	22.6	14.8	9.5	Little worn.
Do	162081	do	77	39.4	60.0		21.5	14.5	9.2	Moderately worn.
Do	162082	do	72	39.2	57.0	24.7	21.7		8.8	Do.
Do	162084	do	76	40.8	58.6	24.8	21.3	14.7	9.0	Do.
Do	162078	Female	83	43.9	64.3	26.5	22.7	15.4	9.5	Do.
Do	162080	do	80	40.3	62.5	26.0	22.3	15.5	9.3	Do.
Do	162083	do	81	41.4	63.2	26.4	22.7	15.9	9.8	Do.
Do	162085	do	82	41.4	60.0	25.8	22.4		9.4	Do.
Do	162086	do	76	39.0	61.6	25.5	22.0		9.3	Unworn.
Do	162087	do		41.2						
Do	162088	do		40.5	63.8		22.6	15.3	9.4	Considerably worn.
Kisumu	182659	Male	70	41.2	58.3	24.5	20.9	13.8	9.2	Little worn.
Do	182661	do	70	40.8	59.4	24.2	21.3	14.3	8.9	Do.
Do	182660	Female	72	40.6	61.4	25.3	21.8	14.8	9.0	Do.
Do	182662	do	70	40.8	58.0	24.1	20.6	14.2	8.5	Do.

L. f. affinis.										
Lado:										
Rhino Camp	164915	Male	....	38.7	....	24.6	21.3	14.6	8.8	Considerably worn.
Do	164916	...do...	68	37.3	....	23.8	20.3	14.1	8.4	Much worn.
Do	164917	...do...	65	37.8	....	22.7	19.4	12.5	8.3	Unworn.
Do	164918	...do...	71	37.2	....	22.9	19.6	13.3	8.5	Moderately worn.
Do	164924	...do...	....	36.2	....	....	....	....	8.4	Much worn.
Do	164925	...do...	....	38.3	....	24.2	20.5	....	9.0	Considerably worn.
Do	164927	...do...	....	36.8	....	23.9	20.3	14.0	8.6	Moderately worn.
Do	164928	...do...	....	37.2	....	23.8	20.2	13.7	8.8	Do
Do	164934	...do...	....	37.1	....	24.2	20.7	14.1	8.7	Do.
Do	164936	...do...	....	....	....	23.7	20.4	....	8.3	Much worn.
Do	164937	...do...	....	....	....	23.5	21.2	13.4	8.7	Moderately worn.
Do	164919	Female	78	36.2	....	24.5	21.2	14.2	9.0	Do.
Do	164920	...do...	81	37.5	....	23.8	20.7	13.7	8.8	Do.
Do	164921	...do...	75	37.4	....	23.5	20.2	13.7	8.5	Unworn.
Do	164922	...do...	....	36.5	....	23.6	20.7	....	8.8	Do.
Do	164923	...do...	....	40.3	....	24.4	21.1	13.9	8.7	Moderately worn.
Do	164926	...do...	....	37.8	....	23.6	20.5	13.8	8.5	Unworn.
Do	164929	...do...	....	37.5	....	24.6	21.3	14.5	8.9	Considerably worn.
Do	164930	...do...	....	37.8	....	23.7	20.8	14.5	8.5	Little worn.
Do	164931	...do...	....	38.3	....	23.9	21.1	....	8.5	Considerably worn.
Do	164932	...do...	....	38.9	56.0	24.3	....	14.0	8.8	Little worn.
Do	164933	...do...	....	38.8	....	23.6	20.5	14.3	8.4	Considerably worn.
Uganda: Mnyouri Jardin	164938	...do...	....	....	....	24.3	20.5	....	8.8	Do.

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[1] Type in alcohol.

LAVIA FRONS AFFINIS Andersen and Wroughton.

1907. *Lavia frons affinis* ANDERSEN and WROUGHTON, Ann. and Mag. Nat. Hist., ser. 7, vol. 19, p. 140. February. (Kaka, White Nile; type in British Museum.)

1910. *Lavia frons affinis* ROOSEVELT, African Game Trails, Amer. ed., p. 474; London ed., p. 486.

1910. *Lavia frons* ROOSEVELT, African Game Trails, Amer. ed., p. 487; London ed., p. 498. (Part.)

Specimens.—Sixty, from the following localities:

SUDAN: Renk, 2 in alcohol (Mearns); Shambe, 2 in alcohol (Heller); White Nile below Lake No, 2 in alcohol (Mearns).

LADO: Rhino Camp, 47, including 25 in alcohol (Loring, Mearns).

UGANDA: Gondokoro, 1 in alcohol (Mearns); Mnyouri Jardin, 1 (Loring); Nimule, 4, including 3 in alcohol (Heller); Uma River, 1 in alcohol, (Mearns).

In addition to the accompanying table of measurements of skins and skulls of *Lavia*, the following dimensions of forearms of alcoholic specimens of the two races are presented:

Lavia frons rex.

Southern Guaso Nyiro River: 60, 62, 59, 60, 57, 60, 62.
Ulukenia Hills: 58, 60.
Sotik: 58, 62.
Kisumu: 62, 60.
Average, 60.

Lavia frons affinis.

Nimule: 56.
Rhino Camp: 60, 56, 58, 59, 61, 58, 56, 59, 59, 58, 58, 59, 60, 62, 58.
Gondokoro: 56.
Renk: 57, 59.
Uma River: 58.
Average, 58.

For complete table of measurements see pages 78–79.

Colonel Roosevelt, in African Game Trails,[1] has the following notes on this bat, as he observed it in the Lado:

> They were very abundant, hanging in the thinly leaved acacias around the tents, and, as everywhere else, were crepuscular; indeed to a large extent actually diurnal in habit. They saw well and flew well by daylight, passing the time hanging from twigs. They became active before sunset. In catching insects they behaved not like swallows but like flycatchers. Except that they perched upside down, so to speak—that is that they hung from twigs instead of sitting on them—their conduct was precisely that of a phoebe bird or a wood peewee. Each bat hung from its twig until it espied a passing insect, when it swooped down upon it, and after a short flight returned with its booty to the same perch or went on to a new one close by; and it kept twitching its long ears as it hung head downward devouring its prey.

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[1] African Game Trails, p. 399. 1910.

Measurements of specimens of Cardioderma cor.

Locality.	No.	Sex.	Head and body.	Ear from notch.	Fore-arm.	Skull: Greatest length.	Condylo-basal length.	Zygomatic breadth.	Greatest breadth across molars.	Entire upper tooth row.	Observations.
Abyssinia: Ogaden	142545	Female	70	40.0	55	25.5	22.5	14.6	9.1	9.5	Alcoholic; teeth much worn.
B. E. A.: Archer's Post	182663	Male	77	37.2	56	....	23.3	16.0	9.5	10.4	Teeth much worn.
Do	182664	...do	70	35.5	57	26.3	23.1	16.0	10.0	10.3	Do.
Do	184817	Female	73	40.2	59	....	....	....	....	....	Alcoholic.
G. E. A.: Mount Kilimanjaro	18994	Male	74	37.0	54	26.0	22.9	15.7	9.2	10.1	Alcoholic; teeth moderately worn.

Genus CARDIODERMA Peters.

1873. *Cardioderma* Peters, Mon.-ber. K. Preuss. Akad. Wiss., Berlin, p. 488. (*C. cor.*)

The single known species of big-eared bats of the genus *Cardioderma* is rare in collections. It was not found by the Smithsonian African Expedition, and was collected by the Rainey Expedition at only one station.

CARDIODERMA COR (Peters).

1872. *Megaderma cor* Peters, Mon.-ber. K. Preuss. Akad. Wiss., Berlin, p. 194. (Abyssinia; type in Berlin Museum.)

1892. *Megaderma cor* True, Proc. U. S. Nat. Mus., vol. 15, p. 468.

Specimens.—Seven, from localities as follows:

Abyssinia: Ogaden, 2 in alcohol (Ruspoli).

British East Africa: Archer's Post, Northern Guaso Nyiro, 4 (Heller).

German East Africa: Mount Kilimanjaro, 1 in alcohol (Abbott).

A female collected at Archer's Post August 18 had a large blind and naked young hanging on her breast. The mammæ are 1/1 anal.

Doctor True[1] lists an additional specimen from Taveta, British East Africa, but this can not now be found in the collection.

For measurements see accompanying table.

Family RHINOLOPHIDÆ.

Genus RHINOLOPHUS Lacépède.

1799. *Rhinolophus* Lacépède, Tabl. des Mamm., p. 15. (*R. ferrumequinum.*)

Four out of six of the species of horseshoe bats which are known from the regions visited were collected by the Smithsonian and Rainey expeditions. Of the overlooked forms, *Rhinolophus fumigatus exsul* was described from Kitui, Ukamba District, British East Africa, and *R. deckenii* from the Zanzibar coast.

For tables of measurements of specimens see pages 82–83.

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[1] Proc. U. S. Nat. Mus., vol. 15, 1892, p. 468.

Measurements of specimens of Rhinolophus from British East Africa.

Form and locality.	No.	Sex.	Forearm.	Skull: Greatest length.	Condylo-basal length.	Zygomatic breadth.	Mandible.	Front of upper canine to back of m^3.	Front of lower canine to back of m_3.	Observations.
R. eloquens.										
Nyuki River	182667	Male	56	25.2	22.8	12.8	16.5	8.8	9.4	Teeth little worn.
Do	182668	...do	57	24.9	22.5	12.7	17.0	9.1	9.8	Teeth moderately worn.
Do	184324	...do	57							Alcoholic.
Do	184327	...do	60							Do.
Do	184328	...do	57							Do.
Do	184331	...do	58							Do.
Do	184332	...do	59							Do.
Do	182665	Female	61	25.6	23.0	12.5	17.2	9.0	9.7	Teeth little worn.
Do	182666	...do	57	24.4	22.3	12.7	16.3	8.8	9.3	Teeth unworn.
Do	184323	...do	59							Alcoholic.
Do	184325	...do	59							Do.
Do	184326	...do	59							Do.
Do	184329	...do	60							Do.
Do	184330	...do	60							Do.
Lake Naivasha	162090	Male	58	25.8	23.1	12.8	17.0	9.1	9.5	Teeth much worn.
Do	162093	...do	60	26.9	24.2	12.9	17.6	9.4	10.0	Do.
Do	162094	...do	56	26.3	23.7	13.1	17.6	9.5	10.2	Teeth moderately worn.
Do	162095	...do	59	25.7	23.1	13.0	16.7	9.4	9.8	Do.
Do	162096	...do	57			12.8	17.4	9.2	9.9	Teeth little worn.
Do	162097	...do	59	26.7	23.9	12.9	17.6	9.0	9.8	Teeth moderately worn.
Do	162098	...do		25.7	22.8	12.6	17.0	8.9	9.4	Do.
Do	162099	...do	57	25.1	22.8	12.5	16.9	9.2	9.6	Teeth little worn.
Do	166350	...do	58							Alcoholic.
Do	166353	...do	60							Do.
Do	166364	...do	60							Do.
Do	166368	...do	60							Do.
Do	166369	...do	58							Do.
Do	166371	...do	58							Do.
Do	166372	...do	57							Do.

R. eloquens—Continued.										
Lake Naivasha	166373	Male	58							Do.
Do	166387	do	57							Do.
Do	162091	Female	58	26.1	23.7		17.3	9.0	9.7	Teeth much worn.
Do	166351	do	59							Alcoholic.
Do	166370	do	58							Do.
So. Guaso Nyiro	166366	Male	58							Do.
R. keniensis.										
Mount Kenia	[1] 166352	Male	52	22.8	20.4	12.0	15.0	8.6	9.0	Alcoholic, skull removed.
R. lobatus.										
Lake Naivasha	162100	Male	43	18.6	16.8	9.5	11.9	6.5	7.1	Teeth unworn.
Kijabe	166354	do	44							Alcoholic.
Do	166357	do	44							Do.
Do	166358	do	44							Do.
Do	166374	do	44							Do.
Do	166375	do	45							Do.
Do	166376	do	44							Do.
Do	166377	do	45							Do.
Do	166378	do	43							Do.
Do	166379	do	44							Do.
Do	166380	do	44							Do.
Do	166381	do	44							Do.
Do	166356	Female	44							Do.
Do	166359	do	45							Do.
Do	166360	do	44							Do.
Do	166361	do	45							Do.
Do	166362	do	46							Do.
Do	166363	do	43							Do.
Do	166382	do	44							Do.

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[1] Type.

RHINOLOPHUS HILDEBRANDTII Peters.

1878. *Rhinolophus hildebrandtii* Peters, Mon.-ber. K. Preuss. Akad. Wiss., Berlin, p. 195. (Ndi, British East Africa; type in Berlin Museum.)

Specimens.—Two, in alcohol, from:

British East Africa: Ulukenia Hills (Loring).

One of these specimens is an old male, with forearm measuring 64 millimeters; the other is quite young and is considerably smaller. The species is readily distinguished from its near relative, *R. eloquens*, by its much larger size.

RHINOLOPHUS ELOQUENS Andersen.

1905. *Rhinolophus hildebrandti eloquens* Andersen, Ann. and Mag. Nat. Hist., ser. 7, vol. 15, p. 74. January. (Entebbe, Uganda; type in British Museum.)

1905. *Rh[inolophus] eloquens* Andersen, Ann. and Mag. Nat. Hist., ser. 7, vol. 16, p. 651. December.

1910. *Rhinolophus hildebrandti eloquens* Roosevelt, African Game Trails, Amer. ed., p. 474; London ed., p. 486.

Specimens.—Forty, from the following localities:

British East Africa: Lake Naivasha, 25, including 15 in alcohol (Mearns, Heller, Loring); Nyuki River, Northern Guaso Nyiro, 14, including 10 in alcohol (Heller); Southern Guaso Nyiro River, 1 in alcohol (Heller).

The Naivasha specimens were taken from a cave near the south end of the lake. The Nyuki River specimens were captured by Heller in a rock cave on the lower river. Doctor Mearns records seeing these bats flying among the trees at Lake Naivasha at twilight. Andersen[1] refers specimens from Machakos and Kenia to *Rhinolophus hildebrandtii* rather than to *R. eloquens*. These specimens from British East Africa, as may be seen from the accompanying table of measurements, agree well in size with true *eloquens* from Uganda, and run far too small for *hildebrandtii*.

RHINOLOPHUS KENIENSIS Hollister.

Plate 10, figs. 11, 12.

1916. *Rhinolophus keniensis* Hollister, Smithsonian Misc. Coll., vol. 66, No. 1, p. 2. February 10. (Mount Kenia, British East Africa; type in U. S. Nat. Mus.)

Specimen.—One, the type in alcohol, from—

British East Africa: West side of Mount Kenia (Heller).

This form is closely allied to *Rhinolophus augur* of South Africa, and will doubtless prove to be a subspecies, intergrading through *R. a. zambesiensis*. The latter has been recorded from Mount Kilimanjaro by Doctor Lönnberg[2] and by Mr. Oldfield Thomas.[3]

RHINOLOPHUS LOBATUS Peters.

1852. *Rhinolophus lobatus* Peters, Reise Mossambique, Säugethiere, p. 41. (Sena, Portuguese East Africa; type in Berlin Museum.)

Specimens.—Twenty, from localities as follows:

British East Africa: Kijabe Station, 19 in alcohol (Loring); Lake Naivasha, 1 (Loring).

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[1] Ann. and Mag. Nat. Hist., ser. 7, vol. 16, 1905, p. 651.

[2] Wiss. Erg. Schwedischen Zool. Exp. Kilimandjaro, Mamm., pp. 8-10. 1908.

[3] Ann. and Mag. Nat. Hist., ser. 8, vol. 11, p. 315. March, 1913.

Family HIPPOSIDERIDÆ.

Genus HIPPOSIDEROS Gray.

1831. *Hipposideros* Gray, Zool. Misc., p. 37. (*H. speoris.*)
1871. *Ptychorhina* Peters, Mon.-ber. K. Preuss. Akad. Wiss. Berlin, p. 325. (*H. caffer.*)

All the recognized forms of this genus of nose-leaf bats which are known from the region are represented in the collection.

HIPPOSIDEROS CAFFER (Sundevall).

1847. *Rhinolophus caffer* Sundevall, Öfv. Kongl. Vet.-Akad. Förh., 1846, p. 118. (Near Port Natal, Natal; type in Stockholm Museum.)

Specimens.—Sixty, from the following localities:

Uganda: Gondokoro, 30, including 21 in alcohol (Loring).

British East Africa: Archer's Post, 1 (Heller); Juja Farm, 1 in alcohol (Mearns); Kijabe, 1 in alcohol (Loring); Nairobi, 3, including 2 in alcohol (Mearns, Heller, Loring); Nairobi River, 1 in alcohol (Mearns); Northern Guaso Nyiro, 1 in alcohol (Mearns); Southern Guaso Nyiro, 21 in alcohol (Heller).

Zanzibar: Zanzibar, 1 in alcohol (Weddell).

As will be seen from the accompanying measurements this species is readily separable from the next by size alone. Although the dimensions of forearms "overlap," there is never the slightest doubt about which species a specimen should be referred to when the skull is examined, and alcoholic specimens of the two species may be separated easily by general bulk and by size and length of head. Among our sixty specimens there are very few representing the red phase, which seems to be rare, quite contrary to the case with the larger species.[1] In examining alcoholic material from the Southern Guaso Nyiro, several specimens of the parasitic Nycteribiidæ were found.

HIPPOSIDEROS RUBER (Noack).

1893. *Phyllorhina rubra* Noack, Zool. Jahrb., Syst., vol. 7, p. 586. December 23. ("Lugerrunjere-Fluss," German East Africa; type in Berlin Museum.)
1906. *Hipposiderus caffer centralis* Andersen, Ann. and Mag. Nat. Hist., ser. 7, vol. 17, p. 277. March. (Entebbe, Uganda; type in British Museum.)
1910. *Hipposiderus caffer centralis* Roosevelt, African Game Trails, Amer. ed., p. 474; London ed., p. 486.

Specimens.—Eighty-nine, from localities as follows:

Sudan: Bor, 1 in alcohol (Heller).

Uganda: Gondokoro, 87, including 71 in alcohol (Loring).

British East Africa: Nairobi, 1 in alcohol (Mearns).

A large per cent of the specimens of this species are in the red phase. The species is usually readily separable from *Hipposideros caffer* by bulk alone; it is a much heavier animal, with decidedly larger head and longer, more powerful forearm. The great difference in the size of the head is perhaps the best character to separate specimens in spirits, unless the skull be removed. The length of forearm is not always diagnostic, but there is never any doubt of the species when the skull is examined.

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[1] In this connection see a recent paper by Dr. Knud Andersen, "On the So-called Colour Phases of the Rufous Horseshoe-bat of India (*Rhinolophus rouxi*, Temm.)," Journ. Bombay Nat. Hist. Soc., vol. 25, No. 2, pp. 260-273, pls. 1, 2. September 15, 1917.

In describing *Hipposideros caffer centralis*, Doctor Andersen considered his new form a subspecies of *caffer*, and believed that only the large form occurred in Uganda. That such is not the case is plainly shown by our excellent series from Gondokoro, where the two species occur together without any indication of intermediate specimens. The type-specimen of Noack's *Phyllorhina rubra*, which Andersen considered one of two known specimens intermediate between *caffer* and *centralis*, but nearer to *caffer*, is, so far as size is concerned, perfectly typical of his *centralis*. The accompanying table of measurements of specimens from which skulls have been removed makes this very plain. Out of the 149 specimens of the two species in our collection there is no trace of intergradation, and the differences between the two species are so great that any blending seems quite improbable. The great difference in bulk between skulls of the two species is poorly indicated by the measurements.

In addition to the dimensions of specimens with skulls listed in the accompanying table, the following measurements have been taken of the forearms of alcoholic specimens of the two species, *caffer* and *ruber:*

Hipposideros caffer.

Gondokoro: 47, 46, 47, 45, 47, 47, 46, 47, 47, 48, 49, 48, 47, 48, 48, 47, 48, 47, 48, 48, 46.

Northern Guaso Nyiro: 47.

Nairobi River: 48.

Nairobi: 48, 48.

Kijabe: 50.

Juja Farm: 49.

Southern Guaso Nyiro: 51, 51, 50, 50, 50, 50, 50, 50, 50, 50, 51.

Zanzibar: 46.

Hipposideros ruber.

Bor: 52.

Gondokoro: 54, 54, 53, 52, 55, 53, 53, 53, 52, 53, 53, 52, 55, 53, 51, 52, 52, 54, 52, 51, 53, 54, 54, 51, 53, 54, 54, 53, 52, 52, 51, 53, 51, 51, 52, 54, 52, 50, 51, 55, 54, 53, 52, 53, 53, 52, 53, 51, 54, 52, 51, 51, 52, 50, 50, 53, 53, 53, 52, 54, 53, 53, 52, 53, 53, 52, 53, 52, 53, 54, 52.

Nairobi: 51.

For complete tables of measurements of specimens see pages 87–88.

Measurements of specimens of Hipposideros caffer and H. ruber.

Species and locality.	No.	Sex.	Fore-arm.	Skull: Greatest length.	Condylo-basal length.	Zygomatic breadth.	Mastoid breadth.	Greatest breadth across outer corners of m^3.	Breadth across upper canines.	Maxillary tooth row, including canine.	Observations.
H. caffer.											
B. E. A.:											
S. Guaso Nyiro	166506	Male	49	17.1	14.8	8.8	9.1	6.3	3.8	5.9	Teeth little worn.
Do	166488	Female	52	17.6	15.4	9.5	9.6	6.1		5.9	Teeth moderately worn.
Do	166489	...do	48	17.3	14.9	9.0	9.3	5.9	3.7	5.7	Teeth little worn.
Do	166491	...do	49	16.9	14.4	8.9	9.2	6.3	3.6	5.8	Teeth moderately worn.
Do	166492	...do	48	17.8	15.1	9.2	9.2	6.0	3.8	5.9	Do.
Do	166494	...do	48	17.7	15.1	9.1	9.4	6.1	3.7	5.7	Do.
Do	166496	...do	49	17.4	15.2	9.2	9.4	6.3	3.7	5.7	Do.
Do	166497	...do	48	17.3	14.9	9.0	9.3	5.9	3.5	5.7	Do.
Do	166499	...do	50	17.4	15.4	9.1	9.2	6.0	3.8	5.9	Do.
Do	166500	...do	50	17.3	15.0			6.1	3.5	5.8	Teeth little worn.
Nairobi	164021	Male	47	17.1	14.8	9.3	9.3	6.2	3.6	5.8	Teeth moderately worn.
Archer's Post	182669	...do	46			9.0	9.0	5.9	4.0	5.8	Teeth little worn.
Jganda:											
Gondokoro	164939	...do		17.2	14.8			6.1	3.9	5.7	Do.
Do	164945	...do		16.7	14.4	9.0	9.0	6.1	3.7	5.7	Teeth moderately worn.
Do	164946	...do		17.2	14.6		9.4			5.7	Teeth little worn.
Do	164947	...do	46	17.2	14.9	9.0	9.2	5.9	3.6	5.8	Do.
Do	164950	...do		17.1	15.1	9.3	9.2	6.0	3.7	5.7	Teeth considerably worn.
Do	164951	...do		16.8	14.4	8.8	9.0	5.8	3.6	5.7	Teeth moderately worn.
Do	164952	...do		16.7	14.4	9.0	8.9	5.7	3.6	5.6	Teeth unworn.
H. ruber.											
Jerman East Africa		Male	51			10.2		6.7	4.5	6.4	Type in Berlin Mus.
Jganda:											
Gondokoro	164944	...do		19.1	16.7	10.4	10.1	6.9	4.7	6.8	Teeth moderately worn.
Do	164949	...do		19.0	16.8	10.2	9.9	7.0	4.6	6.7	Do.
Do	164953	...do		18.9		10.6	10.2	7.2	4.7	6.7	Teeth little worn.
Do	164961	...do	50	19.5		10.6	10.3	7.2	4.7	7.0	Teeth moderately worn.

Measurements of specimens of Hipposideros caffer and H. ruber—Continued.

Species and locality.	No.	Sex.	Fore-arm.	Skull: Greatest length.	Condylo-basal length.	Zygomatic breadth.	Mastoid breadth.	Greatest breadth across outer corners of m^3.	Breadth across upper canines.	Maxillary tooth row, including canine.	Observations.
H. ruber—Continued.											
Gondokoro	164962	....	....	18.9	16.3	10.3	10.1	7.0	4.7	6.8	Teeth little worn.
Do	164963	...do....	52	19.1	16.8	10.6	10.0	7.2	4.5	6.8	Do.
Do	164940	Female	....	18.9	16.3	10.0	10.1	6.8	4.4	6.6	Do.
Do	164941	...do....	....	19.7	17.2	10.7	10.2	7.0	4.5	7.0	Teeth moderately worn.
Do	164943	...do....	50	19.4	17.3	10.5	10.0	7.1	4.4	6.9	Teeth little worn.
Do	164955	...do....	50	19.1	16.6	10.2	10.0	7.0	4.4	6.8	Teeth moderately worn.
Do	164954	...do....	50	19.8	17.4	10.8	10.1	7.3	4.5	6.9	Do.
Do	164956	...do....	51	....	....	10.5	9.9	7.0	4.8	6.8	Do.
Do	164957	...do....	51	19.6	17.4	10.5	10.2	7.1	4.8	6.8	Do.
Do	164958	...do....	52	19.5	17.0	10.4	10.0	7.1	4.6	6.9	Do.
Do	164960	...do....	....	19.6	17.3	10.5	10.0	6.9	4.5	6.8	Do.

HIPPOSIDEROS COMMERSONII MARUNGENSIS (Noack).

1887. *Phyllorhina commersonii* Peters, var. *marungensis* Noack, Zool. Jahrb., Syst., vol. 2, p. 272. May 7. (Qua Mpala, Marungu. Congo.)

Specimen.—One in alcohol:

Zanzibar: Zanzibar (Weddell).

Genus ASELLIA Gray.

1838. *Asellia* Gray, Mag. Zool. and Bot., vol. 2, p. 493. (*A. tridens*.)

The single African species of this genus of nose-leaf bats is well represented in the museum by specimens from Egypt, but by only one specimen from within the geographical limits of the present report.

ASELLIA TRIDENS (Geoffroy).

1813. *Rhinolophus tridens* Geoffroy, Descr. l'Égypte, vol. 2, p. 127. (Tombs of the Kings and temple of Denderah, Egypt.)

1816. *Rh*[*inolophus*] *tridens* Oken, Lehrb. Nat., 3ter Theil, 2te Abth., p. 922.

Specimen.—One in alcohol from—

Sudan: Shendi (Rothschild).

Family VESPERTILIONIDÆ.

Genus MYOTIS Kaup.

1829. *Myotis* Kaup, Skizz. Entw.-Gesch. Nat. Syst. Europ. Thierw., p. 106. (*M. myotis*.)

A single species of *Myotis* is known from British East

Africa. It is apparently a rare bat, as no specimens were collected by either of the large expeditions.

MYOTIS HILDEGARDEÆ Thomas.

1904. *Myotis hildegardeæ* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 13, p. 209. March. (Fort Hall, British East Africa; type in British Museum.)

Specimens.—Two, as follows:

BRITISH EAST AFRICA: Yala River (Turner).

Both of these specimens have abnormal dentition. In each *pm*^{3} is wanting on both sides, and in one skull *pm*$_3$ is absent also. The measurements of the two specimens follow, the first dimensions given are of an adult male, the second of an adult female. Head and body, 48, 47; tail, 44, 42; foot, 9.5, 9; ear, 15, 12.3; forearm, 38.5, 38. Skull: Greatest length, 15.1, 14.8; condylobasal length, 14, 13.7; zygomatic breadth, 9.5, 9.3; breadth of braincase, 7.6, 7.6; interorbital breadth, 3.7, 3.8; length of mandible, 10.7, 10.6. Teeth: Upper row, front of canine to back of *m*^{3}, 5.5, 5.4; lower row, front of canine to back of *m*$_3$, 6, 5.9.

This interesting addition to our collection of African bats was made by Mr. H. J. A. Turner, who collected the specimens November 25 and December 1, 1913.

Genus PIPISTRELLUS Kaup.

1829. *Pipistrellus* KAUP, Skizz. Entw.-Gesch. Nat. Syst. Europ. Thierw., p. 98. (*P. pipistrellus.*)

Five distinct species of the diminutive pipistrelles are included in the collections. One of these, *Pipistrellus rüppelii*, has been placed by Miller [1] in the genus *Scotozous* Dobson. The characters separating *Scotozous* from *Pipistrellus* are not well marked, and *rüppelii*, in a measure, combines features of the two genera. It seems best, therefore, to retain it within the limits of true *Pipistrellus*. Of the three skulls of *rüppelii* examined, two show distinctly a secondary posterior cusp on the upper canines, and in one skull this cusp is more conspicuous than is usual in several species ordinarily referred to true *Pipistrellus*.

For measurements of specimens see table, page 91.

PIPISTRELLUS NANUS (Peters).

1852. *Vespertilio nanus* PETERS, Reise Mossambique, Säugethiere, p. 63. (Inhambane, Portuguese East Africa.)

1910. *Pipistrellus nanus* THOMAS AND WROUGHTON, Trans. Zool. Soc. London, vol. 19, p. 488. March.

1917. *Pipistrellus nanus* ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 37, p. 441. September 29.

Specimens.—Ten, from localities as follows:

UGANDA: Mubuku Valley, East Ruwenzori, 5,000 feet, 1 (Woosnam).

BRITISH EAST AFRICA: Yala River, 9 (Turner).

Of his Ruwenzori specimens, one of which is listed above, Mr. R. B. Woosnam has written:

> These little bats inhabited chiefly the banana plantations, and were found on Ruwenzori up to 6,000 feet.[2]

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[1] Bull. 57, U. S. Nat. Mus., p. 206. 1907.

[2] Trans. Zool. Soc. London, vol. 19, p. 489. March, 1910.

PIPISTRELLUS HELIOS Heller.

Plate 10, figs. 13, 14.

1912. *Pipistrellus helios* HELLER, Smithsonian Misc. Coll., vol. 60, No. 12, p. 3. November 4. (Merelle Water, 30 miles south of Mt. Marsabit. British East Africa; type in U. S. Nat. Mus.)

Specimens.—Sixteen, from localities as follows:

BRITISH EAST AFRICA: Archer's Post, 3 in alcohol (Heller); Lakiundu River, 5, including 3 in alcohol (Heller); Merelle Water, Marsabit Road, 7, including 6 in alcohol (Heller); Northern Guaso Nyiro, 1 (Percival).

This bat agrees in many particulars with the description of *Pipistrellus deserti* Thomas [1] from Tripoli, which has been recorded from British East Africa by Allen [2] and by Dollman.[3] There are certain marked discrepancies in dimensions, however, and Miller, after study of the type-specimen of *deserti*, placed that species in the genus *Scotozous*.[4] This would appear to mean that *deserti* has a very minute outer upper incisor, whereas in *helios* that tooth is particularly large, almost equaling in size the larger inner incisor.

PIPISTRELLUS AERO Heller.

Plate 10, figs. 15, 16.

1912. *Pipistrellus aero* HELLER, Smithsonian Misc. Coll., vol. 60, No. 12, p. 3. November 4. (Mount Gargues, Mathews Range, 7,000 feet, British East Africa; type in U. S. Nat. Mus.)

1917. *Pipistrellus nanus* ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 37, pp. 441, 442. September 29.

Specimens.—Five, including two in alcohol, as follows:

BRITISH EAST AFRICA: Mount Gargues (Heller).

Heller notes that this species was seen only in the heavy forest on the summit of Mount Gargues, 7,000 to 7,100 feet altitude. Numbers were seen at dusk every evening, but no other species was noted at so high an elevation.

PIPISTRELLUS KUHLII FUSCATUS Thomas.

1901. *Pipistrellus kuhlii fuscatus* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 8, p. 34. July. (Naivasha, British East Africa; type in British Museum.)

1910. *Pipistrellus kuhlii fuscatus* ROOSEVELT, African Game Trails, Amer. ed., pp. 474 and 480; London ed., pp. 486 and 491.

Specimens.—Five, from localities as follows:

BRITISH EAST AFRICA: Engare Narok River, 1 (Loring); Kabalolot Hill, Sotik, 1 in alcohol (Heller); Lake Naivasha, 2, including 1 in alcohol (Mearns, Heller); Nairobi, 1 (Heller).

PIPISTRELLUS RÜPPELII (Fischer).

1829. *V[espertilio] rüppelii* FISCHER, Syn. Mamm., p. 109. (Dongola, Sudan.)

Specimens.—Nine, including 6 in alcohol, as follows:

SUDAN: Khartoum (Heller, Loring).

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[1] Proc. Zool. Soc. London, vol. 2, p. 4. 1902.

[2] Bull. Mus. Comp. Zool., vol. 54, p. 325. December, 1911.

[3] Proc. Zool. Soc. London., 1914, p. 308. June, 1914.

[4] Bull. 57, U. S. Nat. Mus., p. 206. 1907.

Measurements of specimens of Pipistrellus.

Form and locality.	No.	Sex.	Forearm.	Skull: Greatest length.	Condylobasal length.	Zygomatic breadth.	Breadth of braincase.	Depth of braincase.	Mandible.	Maxillary tooth row.	Condition of teeth.
P. nanus.											
Uganda: Ruwenzori	172926	Female	32	11.8	10.9		5.9	4.0	7.9	3.8	Little worn.
B. E. A.: Yala River	197945	Male	32	11.5	10.7	6.8	5.9	4.2	7.8	3.7	Moderately worn.
Do	197946	...do	31	11.7	10.7		5.9	3	7.8	3.8	Much worn.
Do.	197952	...do	31	11.8	10.6		5.9	4.2	7.7	3.7	Little worn.
Do	197947	Female	32	11.6	10.7	7.3	5.9	3.9	8.0	3.8	Do.
Do	197948	...do	32	11.8	11.0	6.9	5.7	4.2	8.1	4.1	Do.
Do	197949	...do	32	11.4	10.8	6.8	5.8	4.0	8.0	3.7	Do.
Do	197950	...do	28	11.3	10.1		6.0				Last molar not in line.
Do	197951	...do	32	12.0	10.8		5.8	4.2	8.2	4.0	Moderately worn.
Do	197953	...do	32	11.6	10.7		6.1	4.3	7.8	3.8	Do.
P. helios.											
B. E. A.:											
Lakiundu River	[1] 181813	Male	27	11.3	10.3	6.6	6.0	4.4	7.5	3.6	Considerably worn.
Do	182671	...do	28	11.2	10.0		6.0	4.5	7.3	3.7	Little worn.
Do	182672	...do	28	10.9	9.6		5.8		7.5	3.8	Unworn.
Merelle water	182673			11.4	10.3		5.7	4.2	7.7	3.7	Do.
N. Guaso Nyiro	182670	Female	28								
P. aero.											
B. E. A.: Mount Gargues	[1] 181812	Male	31	12.3	11.6	8.1	6.8	4.6	8.6	4.5	Little worn.
Do	182674	...do	32						9.0	4.6	Do.
Do	182675	...do	31	12.6	11.6	8.2	6.6	4.7	9.0	4.6	Do.
P. k. fuscatus.											
B. E. A.: Lake Naivasha	162108	...do	35	13.6	12.3	8.6	7.2	5.1	9.8	4.9	Moderately worn.
P. rüppelii.											
Sudan: Khartoum	164964	Female		13.1	12.7		6.8	4.8	9.1	4.6	Moderately worn.
Do	164965	...do		13.1	11.8	8.3	6.8	4.9	8.9	4.5	Do.
Do	164966	...do		13.3	12.3	8.3	6.9	4.8	9.2	4.5	Considerably worn.

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[1] Type.

Genus EPTESICUS Rafinesque.

1820. *Eptesicus* RAFINESQUE, Ann. Nat., vol. 1, p. 2. (*E. fuscus*.)

All the smaller bats of this genus that have definitely been determined from the region are included in the collection.

EPTESICUS PHASMA Allen.

1893. *Vesperugo* (*Vesperus*) *rendalli* TRUE, Proc. U. S. Nat. Mus., vol. 16, p. 602. (Not of Thomas.)

1911. *Eptesicus phasma* G. M. ALLEN, Bull. Mus. Comp. Zool., vol. 54, p. 327. December. (Meru River, British East Africa; type in Mus. Comp. Zool., Harvard.)

Specimens.—Fourteen, as follows:

UGANDA: Gondokoro, 1 (Loring).

BRITISH EAST AFRICA: Archer's Post, Northern Guaso Nyiro, 1 (Heller); Lakiundu River, 11, including 7 in alcohol (Heller); Tana River, 1 in alcohol (Chanler).

The specimen from Uganda is slightly darker in color than the specimens from the type region in British East Africa.

EPTESICUS TENUIPINNIS (Peters).

1872. *Vesperus tenuipinnis* PETERS, Mon.-ber. K. Akad. Wiss. Berlin, p. 263. (Guinea.)

Specimen.—One in alcohol, as follows:

LADO: Rhino Camp (Mearns).

EPTESICUS CAPENSIS SOMALICUS (Thomas).

1901. *Vespertilio minutus somalicus* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 8, p. 32. July. (Hargaisa, British Somali; type in British Museum.)

Specimens.—Six, as follows:

BRITISH EAST AFRICA: Archer's Post, Northern Guaso Nyiro, 2 (Heller); Quoy Water, Marsabit Road, 1 (Heller); Southern Guaso Nyiro, 3, including 2 in alcohol (Loring, Mearns).

Specimens from the Southern Guaso Nyiro average somewhat larger than those from north of Kenia. They may be tending toward *Eptesicus capensis gracilior* of Zululand.

EPTESICUS UGANDÆ Hollister.

Plate 10, figs. 17, 18.

1916. *Eptesicus ugandæ* HOLLISTER, Smithsonian Misc. Coll., vol. 66, No. 1, p. 3. February 10. (Ledgus, Uganda; type in U. S. Nat. Mus.)

Specimens.—Six, in alcohol, as follows:

UGANDA: Kiriba Village, 10 miles south of Gondokoro, 3 (Heller); Ledgus, 3 (Loring).

EPTESICUS GRANDIDIERI (Dobson).

1876. *Vesperugo (Vesperus) grandidieri* DOBSON, Ann. Nat. Hist., ser. 4, vol. 18, p. 500. (Zanzibar; type in Paris Museum.)

Specimen: One, in alcohol, from—

BRITISH EAST AFRICA: Southern Guaso Nyiro River (Mearns).

This specimen agrees in every detail with Dobson's description of *E. grandidieri*, except that the hair extends thinly over the greater part of the anterior half of the interfemoral membrane. In the original account, it is stated that the fur "scarcely" extends upon the "membranes." The species is readily distinguished from the other small brown forms of *Eptesicus* known in East Africa by the distinctly bicuspidate upper inner incisors and the great length of the outer upper incisors, which reach nearly to the tip of the outer cusp of the inner incisor.

Genus NYCTICEIUS Rafinesque.

1819. *Nycticeius* RAFINESQUE, Journ. Phys., vol. 88, p. 417. June. (*N. humeralis*.)

1875. *Scoteinus* DOBSON, Proc. Zool. Soc. London, p. 371. (*N. emarginatus*.)

The old world species of bats usually placed in the genus *Scoteinus* do not seem to differ generically from the American species of *Nycticeius*.

NYCTICEIUS AFRICANUS Allen.

1911. *Nycticeius africanus* G. M. ALLEN, Bull. Mus. Comp. Zool., vol. 54, p. 328. December. (Meru River, British East Africa; type in Mus. Comp. Zool., Harvard.)

Specimens.—Fifteen, from localities as follows:

BRITISH EAST AFRICA: Archer's Post, 2 in alcohol (Heller); Kara River, Marsabit Road, 4 (Heller); Lakiundu River, 5, including 3 in alcohol (Heller); Mount Lololokwi, 3, including 1 in alcohol (Heller); Quoy, Marsabit Road, 1 (Heller).

This species seems closely related to *Nycticeius schlieffeni* Peters and should, perhaps, be treated as a subspecies of that form.

Genus SCOTŒCUS Thomas.

1901. *Scotœcus* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 7, p. 263. March. (*S. albofuscus*.)

This genus is closely related to *Nycticeius* and even more closely to the American genus *Nycteris*. The resemblance of the skull to the skull of *Nycteris borealis* is very striking, and the presence of the small upper premolar in a large per cent of specimens leaves the genus separable from *Nycteris* only by the unfurred interfemoral membrane.

SCOTŒCUS HINDEI Thomas.

1901. *Scotœcus hindei* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 7, p. 264. (Kitui, British East Africa; type in British Museum.)

Specimens.—Seven, from localities as follows:

BRITISH EAST AFRICA: Archer's Post, 4, including 1 in alcohol (Heller); Lakiundu River, 2, including 1 in alcohol (Heller); Northern Guaso Nyiro, 1 odd skull (Heller).

Out of five skulls of this species in the collection four have the small spike-like upper premolar as described by Wroughton[1] and by G. M. Allen.[2] The normal dentition of the species would seem to include two upper premolars. In the skull in the United States National Museum collection which lacks the small premolar, the tiny alveolus can be seen on one side with a strong glass.

SCOTŒCUS ALBIGULA Thomas.

1901. *Scotœcus albigula* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 544. (Kirui, Mt. Elgon, British East Africa; type in British Museum.)

Specimens.—Two in alcohol, as follows:

UGANDA: Kiriba (Heller).

The skull of one of these specimens has been removed and exhibits the small upper premolars as described by Thomas in the type.

Genus SCOTOPHILUS Leach.

1821. *Scotophilus* LEACH, Trans. Linn. Soc. London, vol. 13, p. 69. (*S. kuhlii.*)
1831. *Pachyotus* GRAY, Zool. Misc., p. 38. (*S. kuhlii.*)

The widely ranging bat *Scotophilus nigrita* (Schreber) is represented in the collection by the common subspecies of British East Africa.

SCOTOPHILUS NIGRITA COLIAS Thomas.

1904. *Scotophilus nigrita colias* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 13, p. 207. March. (Fort Hall, British East Africa; type in British Museum.)

1910. *Scotophilus nigrita colias* ROOSEVELT, African Game Trails, Amer. ed. p. 474; London ed., p. 486.

1910. *Scotophilus migrita colias* ROOSEVELT, African Game Trails, Amer. ed., p. 480; London ed., p. 491.

Specimens.—Thirteen, from the following localities:

BRITISH EAST AFRICA: Archer's Post, 1 (Heller); Lakiundu River, 1 (Heller); Merelle River, Marsabit Road, 2, including 1 in alcohol (Heller); Nairobi, 9, including 7 in alcohol (Mearns, Heller, Loring).

> Common at Nairobi; flying among the tree tops in the evening. Has the same flight as our big brown bat—*Vespertilio fuscus*. (Roosevelt, Afr. Game Trails, p. 480.)

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[1] Mem. Proc. Manchester Lit. Philos. Soc., pt. 2, No. 5, p. 4 1907.

[2] Bull. Mus. Comp. Zool., vol. 54, No. 9, p. 330. 1911.

Genus MINIOPTERUS Bonaparte.

1837. *Miniopterus* Bonaparte, Icon. Fauna Italica, vol. 1, fasc. 20, under *V. emarginatus*. (*M. schreibersii*.)

The African forms of this genus of bats are badly in need of careful revision. The single species included in our collection from East Africa is closely related to *M. schreibersii* of Europe.

MINIOPTERUS NATALENSIS ARENARIUS Heller.

Plate 10, figs. 19, 20.

1912. *Miniopterus natalensis arenarius* Heller, Smithsonian Misc. Coll., vol. 60, No. 12, p. 2. November 4. (Nyuki River, Northern Guaso Nyiro, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Thirteen, as follows:

British East Africa: Lake Naivasha, 8, including 6 in alcohol (Heller, Mearns, Loring); Northern Guaso Nyiro River, 1 (Heller); Ngare Nyuki, 2, including 1 in alcohol (Heller); Ulukenia Hills, 2 in alcohol (Loring).

The Naivasha Lake specimens seem to be inseparable from those from the type region. The form is very close to true *natalensis*, but is slightly darker in color (not paler, as stated in the original description). The type-specimen was captured, with specimens of *Rhinolophus*, in a rock cave.

Family MOLOSSIDÆ.

Genus CHÆREPHON Dobson.

1874. *Chærephon* Dobson, Journ. Asiatic Soc. Bengal, vol. 43, pt. 2, p. 144. (*C. johorensis*.)

The species of this genus of free-tailed bats included in our East African collections are all members of the "*pumilus* group." The exact status of these and other forms described within the group is still uncertain, as the variation in pattern and extent of the white markings, which have been used as specific characters, seem to be to a considerable degree individual. The position and shape of the small upper premolar is likewise subject to great variation in a series from one locality.

For tables of measurements of specimens see pages 96-97.

CHÆREPHON PUMILUS PUMILUS (Cretzschmar).

1826. *Dysopes pumilus* Cretzschmar, Rüpp. Atlas Zool., vol. 1, p. 69. (Massaua, Eritrea.)

Specimens.—Twenty-three, from localities as follows:

Eritrea: Massaua, 1 in alcohol (Genoa Mus.); Saaita, 4 in alcohol (Raggazzi).

Sudan: Mongalla, 8 in alcohol (Heller).

Uganda: Gondokoro, 10, including 7 in alcohol (Loring).

Measurements of specimens of Chaerephon.

Form and locality.	No.	Sex.	Forearm.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital constriction.	Mastoid breadth.	Mandible.	Maxillary tooth row, including canine.	Entire lower tooth row.	Observations.
C. p. pumilus.											
Eritrea:											
Massaua [1]	18546	Female	37	14.8	10.0	3.6	9.0	11.2	6.1	6.8	Teeth moderately worn.
Saaita	143166	Male	38	15.4	10.4	3.5	9.2	11.8	6.2	7.0	Do.
Do	143167	...do	37	15.8	10.7	3.7	9.2	11.6	6.2	6.7	Do.
Do	143168	...do	35								Young; in alcohol.
Do	143169	Female	39								In alcohol.
Sudan: Mongalla	166675	...do	36				9.5	11.0	6.0	6.4	Teeth moderately worn.
Do	166676	...do	37	14.7	9.8		9.5	11.1	5.9	6.2	Do.
Do	166677	...do	37	14.6	10.0	4.0	9.8	10.8	5.9	6.3	Do.
Do	166678	...do	36		9.9	3.7		10.7	5.8	6.5	Do.
Uganda: Gondokoro	164972	Male		14.2	9.3	3.6	8.8	10.2	5.6	6.4	Teeth unworn.
Do	166679	...do	36					11.0		6.5	Teeth moderately worn.
Do	166683	...do	36	14.8		3.7	9.8	10.5	5.9	6.3	Do.
Do	166684	...do	36								In alcohol.
Do	166687	...do	38	15.2	10.2	3.7	9.4	11.2	6.1	6.8	Teeth moderately worn.
Do	164970	Female	36					10.8	5.7	6.5	Teeth little worn.
Do	164971	...do	36	14.8	9.8	3.6	9.4	10.8	5.8	6.4	Do.
Do	166682	...do	37	14.6		3.8	9.4	11.2		6.8	Teeth moderately worn.
Do	166685	...do	36								In alcohol.
Do	166686	...do	35								Do.
C. p. naivashæ.											
B. E. A.: Naivasha	[2] 166658	Male	42	16.0	10.8	4.0	9.9	11.7	6.3	7.3	Teeth moderately worn.
Do	166659	...do	41	18.7	10.8	3.8	9.8	11.7	6.2	7.3	Do.
Do	166664	...do	39								In alcohol.
Do	166665	...do	40								Do.
Do	166666	...do	41	15.8	10.3	3.9	10.0	11.7	6.0	7.0	Teeth little worn.
Do	162101	Female	40	15.6	9.8	4.0		11.8	6.2	7.1	Teeth moderately worn.
Do	162102	...do	40	15.6	10.3	3.8	9.6	11.2	6.2	7.0	Teeth little worn.

Do.	162108	...do.....	41	15.0	9.9	3.8	9.5	11.6	5.9	6.9	Teeth moderately worn.
Do.	166657	...do.....	40	....	....	....	....	....	....	....	In alcohol.
Do.	166660	...do.....	39	....	....	....	....	....	....	....	Do.
Do.	166661	...do.....	42	15.8	10.3	4.0	9.8	11.9	6.1	6.9	Teeth moderately worn.
Do.	166662	...do.....	40	....	....	....	....	....	....	....	In alcohol.
Do.	166663	...do.....	39	....	....	....	....	....	....	....	Do.
Do.	166667	...do.....	40	....	....	....	....	....	....	....	Do.
Do.	166668	...do.....	40	....	....	....	....	....	....	....	Do.
C. hindei.											
B. E. A.:											
Fort Hall.	164018	Male....	39	16.9	11.0	3.9	10.2	12.5	7.0	7.5	Teeth moderately worn.
Do.	164019	...do.....	40	17.0	10.9	4.0	10.0	13.1	6.9	7.3	Do.
Do.	164020	...do.....	37	15.9	10.8	3.7	9.8	12.4	6.6	7.4	Do.
Do.	166689	...do.....	38	....	....	....	....	....	....	....	In alcohol.
Do.	166691	...do.....	38	....	....	....	....	....	....	....	Do.
Do.	164017	Female..	40	16.8	10.4	3.6	9.8	11.8	6.5	7.5	Teeth moderately worn.
Do.	166669	...do.....	39	....	....	....	....	....	....	....	In alcohol.
Do.	166690	...do.....	39	....	....	....	....	....	....	....	Do.
Mtoto Andei.	181467	Male....	38	16.8	11.1	3.8	....	12.5	6.6	7.5	Teeth little worn.
Do.	181463	Female..	37	16.2	11.5	3.6	9.8	11.8	6.4	7.3	Teeth moderately worn.
Do.	181464	...do.....	....	15.5	11.5	3.7	9.8	11.2	6.5	7.1	Teeth little worn.
Do.	181465	...do.....	38	16.3	10.6	3.6	9.8	11.8	6.6	7.5	Do.
Do.	181466	...do.....	38	16.2	10.8	3.6	9.9	12.2	6.6	7.5	Do.
C. limbatus.											
Zanzibar.	17899	Male....	38	....	....	....	....	....	....	....	In alcohol.
Do.	174673	...do.....	36	....	....	....	....	....	....	....	Do.
Do.	174672	Female..	37	16.2	10.8	3.8	9.8	12.2	6.2	7.1	Teeth moderately worn.
Do.	174674	...do.....	38	15.7	10.4	3.6	9.4	11.7	6.4	7.3	Do.
Do.	174675	...do.....	38	15.8	10.4	3.6	9.6	12.0	6.3	7.2	Do.
Do.	174676	...do.....	39	....	....	....	....	....	....	....	In alcohol.
Do.	174677	...do.....	36	....	....	....	....	....	....	....	Do.
C. emini.											
Uganda: Gondokoro.	166688	...do.....	42	17.2	11.2	4.1	10.8	12.7	6.9	7.9	Teeth little worn.

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[1] Type locality.

[2] Type.

CHÆREPHON PUMILUS NAIVASHÆ Hollister.

Plate 11, figs. 1. 2.

1910. *Nyctinomus hindei* ROOSEVELT, African Game Trails, Amer. ed., p. 480; London ed., p. 491. (Part, specimens from Naivasha; not of Thomas.)

1916. *Chærephon pumilus naivashæ* HOLLISTER, Smithsonian Misc. Coll., vol. 66, No. 1, p. 4. February 10. (Naivasha Station, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Fifteen, including 12 in alcohol, as follows:

BRITISH EAST AFRICA: Naivasha Station (Loring).

This subspecies is larger and darker than true *pumilus* of Eritrea and Sudan, and has a longer forearm. One skin is a rich reddish brown, quite different from the ordinary blackish specimens.

CHÆREPHON HINDEI (Thomas).

1904. *Nyctinomus hindei* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 13, p. 210. March. (Fort Hall, British East Africa; type in British Museum.)

1910. *Nyctinomus hindei* ROOSEVELT, African Game Trails, Amer. ed., p. 480; London ed., p. 491. (Part, reference to Athi Plains.)

1917. *C[hærephon] hindei* ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 37, p. 457, September 29.

Specimens.—Twenty-five, from the following localities:

BRITISH EAST AFRICA: Fort Hall, 8, including 4 in alcohol (Loring); Mtoto Andei, 17, including 12 in alcohol (Heller).

Three out of four skins from the Fort Hall series have the light-colored wing membranes as described by Thomas of the type. One specimen has dark blackish-brown wing membranes, but is in all other respects exactly like the white-winged specimens. In the Mtoto Andei series there is likewise a single specimen with dark wings.

CHÆREPHON LIMBATUS (Peters).

1852. *Dysopes limbatus* PETERS, Reise Mossambique, vol. 1, p. 56, pl. 14. (Mossambique, Portuguese East Africa; cotypes in Berlin Museum.)

Specimens.—Seven, as follows:

ZANZIBAR: Zanzibar, 7 in alcohol (Weddell, Salmin).

There is great variation in the extent of the white on the underparts in these seven specimens from Zanzibar. In one specimen the white covers the entire underparts except for a small broken band of dark across the upper chest; in another it is restricted to the center of the lower breast and the belly, like the figure in Peters's plate; and there are specimens between these two extremes of coloration. It would seem that the extent or pattern of the white below is of very little use in distinguishing forms of these bats.

CHÆREPHON EMINI (de Winton).

1901. *Nyctinomus emini* DE WINTON, Ann. and Mag. Nat. Hist., ser. 7, vol. 7, p. 40. (Usambiro,[1] German East Africa; type in British Museum.)

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[1] In the original description the type locality is given as "Mosambiro"; the correction was made by Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 13, p. 210, March, 1914.

Specimen.—One in alcohol, as follows:

UGANDA: Gondokoro (Loring).

Externally this specimen agrees in all details with the description of *Chærephon emini*. The skull is peculiar for a *Chærephon*, however, having a very flat braincase and incompletely ossified premaxillæ, approaching in these characters certain species of *Nyctinomus*. As no description of the skull, with measurements, of *Chærephon emini* has ever been published, I wrote to Mr. Oldfield Thomas asking for information regarding it, sending him a rather complete description of this specimen from Gondokoro. His reply, in part, is as follows:

> The type skull of *Chærephon emini* is unfortunately much smashed, consisting of but little more than the muzzle, which accounts for the absence of published measurements. What there is of it, however, agrees so nearly with what you say of yours that it seems probable that the two are the same, as you suppose. The color of the fur is quite the same and there is but little difference in the measurements. The median ossification between the premaxillæ is very imperfect, thin, and with vacuities in it, so that one might expect to find examples without a median connection at all. The maxillary tooth row is 7.1 mm. Incisors and small premolar as you describe. Owing to the imperfection of the skull, the shape of the braincase is not determinable.

It seems probable then that this specimen from Gondokoro is *emini*, and that the skull of that species is quite *Nyctinomus*-like, though with less emargination of the anterior palate than is usual in *Nyctinomus*. The generic separation of *Chærephon* is perhaps questionable.

A more complete description of the Gondokoro specimen, an adult female in alcohol, with skull removed, number 166688, U. S. N. M., follows: Nose pad large, protruding, and glandular, with distinct leaflike, serrated upper margin and median dividing ridge; lips deeply furrowed by six-seven vertical wrinkles on each side. Ears large, subquadrate, connected by the inner margins and a wide supplemental fold, which forms a deep sac with large posterior entrance, extending under marginal connection in the form of a glandular protuberance to the base of the hard, triangular nose pad where there are four small, circular, wartlike, stiffly bristled spots, apparently glandular openings. Anterior side of ears slightly convex, the margin folded backward nearly to first tip corner; posterior, or rather upper, margin concave anteriorly and convex posteriorly; keel conspicuous, broad basally and gently tapering toward center of anterior margin of ear; antitragus large, rounded; tragus small, subquadrate, the anterior and lower sides slightly emarginate; throat with a small bristly glandular spot set in center of large bare space; wing from front side of lower half of tibia; tail free for about three-fifths its length; fur extending on wing above to line from middle of humerus to middle of femur, and only slightly on to base of interfemoral membrane and inner edge of antebrachial membrane; beneath, the membranes are virtually naked, except for a few white hairs on antebrachial membranes, a strip of white hair crossing wing parallel with and close to body, and scattering white hairs on interfemoral membrane. Thumb pad comparatively small. Feet large, the toes with numerous long hairs. Color (from alcoholic specimen) above, uniform dark brown, the membranes paler with narrow strip of buff along lower edge of wings near foot; below slightly lighter than back, the hairs with lighter bases and lighter tips; middle of belly whitish; wing membranes beneath whitish near body and blending into pale brown about middle of wing; interfemoral membrane beneath whitish or pale buffy. Skull flat, with narrow interorbital region and wide, flat braincase; emargination of palate between premaxillæ comparatively very slight, narrow, and reaching backward to plane of center of canines. Upper incisors large, the inner sides nearly parallel; small upper premolar comparatively large, in middle of line of row, and considerably higher than cingulum of large premolar; molars robust; lower incisors crowded, the outer ones partially hidden behind the middle pair which have broad bilobed crowns. Measurements: Head and body, 64; tail, 50; forearm, 42; third finger metacarpal, 40.3; first phalanx, 17.6, second phalanx, 16.5; fourth metacarpal, 38.9; fifth metacarpal, 24.5; tibia, 12; foot, with claws, 8.2. Skull: Greatest length, 18.3; condylobasal length, 17.2; median basal length, 13.8; zygomatic breadth, 11.2; postorbital constriction, 4.1; mastoid breadth, 10.8; depth of braincase, 5.5; mandible, 12.7; maxillary tooth row, including canine, 6.9; greatest breadth across maxillary rows, 8.2; greatest breadth across upper canines, 4.9; width of first upper molar, 2.2; entire lower tooth row, 7.9.

Genus NYCTINOMUS Geoffroy.

1813. *Nyctinomus* Geoffroy, Desc. l'Égypte, vol. 2, p. 114. (*N. ægyptiacus.*)
1814. *Tadarida* Rafinesque, Précis Découv. Somiol., p. 55. (*N. teniotis.*)
1816. *Nyctinomus* Oken, Lehrb. Nat., 3ter Theil, 2te Abth., p. 924. (*N. ægyptiacus.*)
1914. *Tadarida* Lyon, Proc. Biol. Soc. Washington, vol. 27, p. 217.[1]

The free-tailed bats of the restricted genus *Nyctinomus* are apparently rare in East Africa, as they are not often obtained by collectors. A single species was obtained by the Smithsonian African Expedition.

NYCTINOMUS ÆGYPTIACUS Geoffroy.

1813. *Nyctinomus ægyptiacus* Geoffroy, Desc. l'Égypte, vol. 2, p. 128. (Egypt; type in Paris Museum.)

Specimen.—One in alcohol as follows:

British East Africa: Juja Farm (Loring).

Measurements of this important specimen are as follows: Forearm, 50 millimeters; skull, greatest length, 20.5; condylobasal length, 19.5; zygomatic breadth, 12.2; mastoid breadth, 11.1; depth of braincase,

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[1] See remarks, p. 71.

6.1; postorbital constriction, 4.8; mandible, 15; upper tooth row, including canine, 7.7; greatest breadth across last upper molars, 8.4; entire lower tooth row, 9.3. The specimen was captured May 18, 1909.

Order CARNIVORA.

Family CANIDÆ.

Genus THOS Oken.

1816. *Thos* OKEN, Lehrb. Nat., 3ter Theil, 2te Abth., p. 1037. (*T. aureus.*)

1837. *Vulpicanis* BLAINVILLE, Ann. Sci. Nat., Paris, ser. 2, vol. 8, p. 279. (*T. aureus.*)

1841. *Oxygoüs* HODGSON, Calcutta Journ. Nat. Hist., vol. 2, p. 213. July. (*T. aureus indicus.*)

1869. *Dieba* GRAY, Cat. Carn. Mamm. Brit. Mus., p. 180. (*T. aureus anthus.*)

1906. *Lupulella* HILZHEIMER, Zool. Beob., vol. 47, p. 363. December. (*T. mesomelas.*)

1906. *Schaeffia* HILZHEIMER, Zool. Beob., vol. 47, p. 364. December. (*T. adustus.*)

1906. *Alopedon* HILZHEIMER, Zool. Beob., vol. 47, p. 365. December. (*C[anis] thooides* Hilzheimer="*C. anthus* Cretzschmar, not of Cuvier.")

1914. *Thos* HELLER, Smithsonian Misc. Coll., vol. 63, No. 7, p. 1. June 24.

Concerning the jackals of this region Heller has written as follows:

> East equatorial Africa or rather Northeast Africa generally is supplied with more species of jackals than any other region. Three distinct species are found living together on the same plains over most of the territory of British East Africa. The most distinct of the three species in coloration is the black-backed or *T. mesomelas*, which has the black of the back sharply marked off from the bright rufous of the sides. The Indian species, *T. aureus*, which here reaches its southern limit in Africa, approaches *mesomelas* closely in shape of skull and the large size of its reddish ears, but differs by the broken character of its black dorsal area which merges indefinitely into the color of the sides. The best marked species of the three in skull characters is the side-striped jackal or *T. adustus*, which has a long slender snout and very long *Vulpes*-like canine teeth. In body coloration, however, it is not always easily distinguishable from the Indian, but it may be recognized with certainty by its small dark-colored ears and the presence of a more or less well-marked white tail tip. (Heller, Smiths. Misc. Coll., vol. 63, No. 7, pp. 1–2.)

For measurements of specimens of jackals see tables, pages 104-108.

THOS ADUSTUS BWEHA Heller.

Plates 12, 13.

1914. *Thos adustus bweha* HELLER, Smithsonian Misc. Coll., vol. 63, No. 7, p. 3. June 24. (Kisumu, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Six, from localities as follows:

BRITISH EAST AFRICA: Guas Ngishu Plateau, 2 (White); Kakumega, 1 (Heller); Kisumu, 3 (Heller).

The Swahili name for the jackal and the one commonly adopted by the interior tribes now in touch with European civilization is *bweha*. Distinctive names for the three species occurring together throughout the country do not appear to be in use among any of the tribes (Heller).

THOS ADUSTUS NOTATUS Heller.

Plates 14, 15.

1914. *Thos adustus notatus* HELLER, Smithsonian Misc. Coll., vol. 63, No. 7, p. 4. June 24. (Loita Plains, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Six, as follows:

BRITISH EAST AFRICA: Loita Plains, Sotik, 2 (Rainey, Heller); Nairobi, 2 odd skulls (Mearns); Telek River, Sotik, 1 (Heller).

GERMAN EAST AFRICA: Ikoma, 1 skull (E. Clark).

The material representing this race of the side-striped jackal is rather unsatisfactory. The subspecies is not a very well-marked one, and I will not be surprised if, when larger series for examination are available, it is found impossible to recognize more than one race of *adustus* in British East Africa. Two of the three skins are very conspicuous in their white markings below; but the third, a youngish female, is indistinguishable from specimens of *Thos adustus bweha*. This color difference is not sexual, as suggested by Heller,[1] because the second Loita Plains specimen, in all respects colored like the type male, proves to be a female, and not an adult male, as stated by Heller.

THOS AUREUS VARIEGATUS (Cretzschmar).

1826. *Canis variegatus* CRETZSCHMAR, Rüpp. Atlas. Zool., vol. 1, p. 31. (Nubia; type in Frankfort Museum.)

Specimen.—One, from—

ERITREA: Habesch (Schrader).

THOS AUREUS BEA Heller.

Plates 16, 17.

1910. *Canis variegatus* ROOSEVELT, African Game Trails, Amer. ed., p. 473. London ed., p. 485. (Not of Cretzschmar.)

1914. *Thos aureus bea* HELLER, Smithsonian Misc. Coll., vol. 63, No. 7, p. 5; June 24. (Loita Plains, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Eleven, from localities as follows:

BRITISH EAST AFRICA: Kasorongai River, 2 (Mearns, Loring); Laikipia Plains, 2 (K. Roosevelt, Heller); Lake Naivasha, 1 (Heller); Loita Plains, Sotik, 2 (Rainey, Heller); Naivasha Station, 1 odd skull (Loring); Oni, 1 (Loring); Sotik Road, Sotik, 1 (Rainey); Suswa Plain, 1 (Rainey).

This subspecies is readily distinguishable from the more northern *variegatus* by its much smaller size. It is the most southern race of *aureus* and the only one known to extend south of the Equator.

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[1] Smithsonian Misc. Coll., vol. 63, No. 7, p. 4. June 24, 1914.

THOS MESOMELAS ELGONÆ Heller.

Plates 18, 19.

1914. *Thos mesomelas elgonae* HELLER, Smithsonian Misc. Coll., vol. 63, No. 7, p. 6. June 24. (Guas Ngishu Plateau, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Ten, as follows:

BRITISH EAST AFRICA: Guas Ngishu Plateau (White, Heller, K. Roosevelt).

THOS MESOMELAS MCMILLANI Heller.

Plates 20, 21.

1892. *Canis mesomelas* TRUE, Proc. U. S. Nat. Mus., vol. 15, p. 455. (Taveta; not of Schreber.)

1914. *Thos mesomelas mcmillani* HELLER, Smithsonian Misc. Coll., vol. 63, No. 7, p. 6. June 24. (Mtoto Andei, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Thirty-nine, from the following localities:

BRITISH EAST AFRICA: Archer's Post, 4 (Heller); Kabalolot Hill, Sotik, 3 (Heller); Koya Water, Marsabit Road, 2 (Heller); Lakiundu River, 6 (Rainey, Heller); Lime Springs, Sotik, 3 (Rainey); Loita Plains, 1 (Heller); Merelle Water, 7 (Heller); Mtoto Andei, 1 (Heller); Southern Guaso Nyiro River, 4 (Mearns, Heller); Taveta, 1 (Abbott); Telek River, Sotik, 5 (Heller, Rainey); Ulukenia Hills, 1 (Loring).

GERMAN EAST AFRICA: Mount Kilimanjaro, 1, mounted (Abbott.)

This race is confined to the coast drainage and the lower parts of the Rift Valley and is the only jackal which is found in the low desert nyika country (Heller).

Genus LYCAON Gray.

1827. *Lycaon* (BROOKS) GRAY, Griffith's Cuvier, vol. 5, p. 151. (*L. pictus.*)

1829. *Cynhyæna* CUVIER, Dict. Sci. Nat., vol. 59, p. 454. (*L. pictus.*)

1842. *Hyenoides* BOITARD, Jardin Plantes, p. 163. (*L. pictus.*)

1842. *Kynos* RÜPPELL, Mus. Senckenberg, vol. 3, p. 163. (*L. pictus.*)

The hunting dog, the largest of the African Canidæ, is related closely to the genus *Cuon* of Asia, but is distinguished by having only four toes on each foot and by the presence of an additional lower molar tooth. A subspecies described from British Somaliland, *Lycaon pictus somalicus* Thomas, is not represented in our collection.

I have seen a reference to a paper by Dr. Paul Matschie,[1] in which 26 new forms of *Lycaon* are said to be described. This publication is not available in America since the beginning of the war in Europe.[2]

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[1] Mitteilungen über Hyänenhunde, Sitz.-Ber. Ges. nat. Freunde Berlin, 1915, pp. 309–391.

[2] It is possible that other papers dealing with groups included in this report and published by German authors since the beginning of the war have not been seen, as the receipt of German scientific publications has been for the past three years very irregular or even entirely discontinued.

Measurements of skulls of Thos from British East Africa.

Form and locality.	No.	Sex.	Condylobasal length.	Zygomatic breadth	Mastoid breadth.	Postorbital constriction.	Interorbital constriction.	Rostral breadth over canine.	Lachrymal foramen to alveolar point.	Median length nasals.	Mandible.	Maxillary tooth row.	Lower molar-premolar row.	Observations.
T. adustus bweha.														
Guas Ngishu Plateau	173019	Male	155	85	53	31	27.4	27.0	67	63	121	68	61	Basal suture closed.
Do	173016	Female	142	75	49	27	26.7	24.4	61	55	110	64	57	Do.
Kakumega	182384	...do	142	71	49	30	21.7	24.8	61	50	110	66	62	Basal suture open.
Kisumu	[1] 182342	Male	152	82	49	30	27.2	27.0	67	53	120	69	60	Basal suture closed.
Do	182343	...do	153	84	50	31	27.5	27.1	66	59	120	69	61	Do.
Do	182348	...do	153	83	51	32	27.9	27.6	64	58	119	68	61	Do.
T. adustus notatus.														
Nairobi	162137	Male	156	80	50	28	25.7	27.2	68	58	121	....	63	Basal suture closed.
Loita Plains	[1] 181486	...do	152	79	51	31	26.7	27.8	66	53	120	71	66	Basal suture open.
Do	181488	Female	145	81	49	31	28.0	24.5	64	51	112	67	62	Basal suture closed.
Telek River	181496	...do	141	72	47	31	23.0	26.0	62	53	108	66	63	Basal suture open.
T. aureus bea.														
Loita Plains	181504	Male	139	77	47	25	23.4	24.5	63	48	108	64	61	Basal suture open.
Do	[1] 162904	Female	139	76	48	26	23.6	25.3	63	48	108	66	63	Basal suture closed.
Naivasha	162139	Male	145	78	51	31	26.2	25.2	65	50	111	66	63	Do.
Do	162905	Female	142	75	48	27	23.1	24.4	65	49	108	66	62	Basal suture open.
Suswa Plains	182007	...do	139	77	48	27	25.4	24.6	63	47	108	64	61	Basal suture closed.
Kasorongai River	163293	...do	144	80	50	30	26.3	25.2	63	47	109	65	60	Do.
Do	163301	...do	145	79	50	27	26.5	24.8	64	47	112	64	62	Do.
Oni	163302	...do	143	79	50	30	26.8	24.3	65	50	110	63	58	Do.
Laikipia	164750	Male	147	76	51	30	24.2	26.0	66	52	115	67	62	Basal suture open.
Do	164698	Female	141	80	48	29	25.1	23.9	61	43	109	64	60	Basal suture closed.
T. mesomelas elgonae.														
Guas Ngishu Plateau	[1] 164699	Male	140	84	50	31	28.4	24.0	66	48	109	64	59	Basal suture closed.

Do.	173015	....	144	....	....	....	....	24.6	63	44	110	66	59	....
Do.	173017	....	143	88	53	34	30.6	26.0	62	43	....	65	....	Basal suture closed.
Do.	173020	....	141	90	51	....	31.4	26.1	61	45	109	65	59	Do.
Do.	173014	....	143	87	51	34	30.2	24.5	62	47	110	64	54	Do.
Do.	173018	....	142	82	50	32	28.2	22.9	62	....	109	66	58	Do.
Do.	164611	Female	136	83	51	33	28.0	23.3	56	41	109	60	51	Do.
Do.	164614	...do.....	143	83	52	30	27.4	24.0	61	47	110	65	61	Do.
Do.	164752	...do.....	142	82	51	31	27.0	24.0	62	44	109	65	56	Do.
T. mesomelas mcmillani.														
Taveta	18941	....	143	82	50	35	30.2	24.8	63	51	110	66	60	Basal suture closed.
Mtoto Andei	[1] 181483	Female	137	81	49	32	29.2	24.4	59	49	107	64	57	Do.
Ulukenia Hills	164546	....	143	83	52	33	33.0	26.4	63	54	112	66	61	Do.
Loita Plains	181503	Female	140	82	50	34	28.2	25.9	61	45	109	63	60	Do.
Lime Springs	181490	Male	139	83	50	33	27.6	26.6	59	46	107	63	59	Do.
Do.	181491	...do.....	146	85	41	34	28.7	26.0	64	50	112	65	62	Do.
Do.	181489	Female	134	80	49	33	27.8	24.2	59	50	104	62	58	Do.
Kabalolot Hill	181493	Male	144	81	50	33	29.3	24.7	62	53	111	65	60	Do.
Do.	181492	Female	141	81	52	32	26.2	24.8	59	43	108	62	58	Do.
Do.	181494	...do.....	139	84	49	34	30.0	25.4	60	49	107	63	57	Do.
Telek River	181499	Male	144	85	53	31	28.8	26.3	63	53	113	66	61	Do.
Do.	181497	Female	137	83	50	34	27.7	24.2	59	48	106	62	58	Do.
Do.	181498	...do.....	143	84	54	31	26.1	25.6	63	47	112	66	61	Do.
Do.	181500	...do.....	143	81	52	31	26.3	25.0	61	57	110	63	60	Do.
Do.	181501	...do.....	148	84	52	31	27.1	25.6	63	51	114	65	60	Do.
So. Guaso Nyiro	162135	Male	153	87	55	34	29.0	26.7	66	54	116	69	64	Do.
Do.	162903	...do.....	143	83	51	32	29.7	24.7	63	47	111	65	60	Do.
Do.	162136	Female	149	83	51	32	27.4	25.5	64	49	113	68	63	Do.
Do.	162902	...do.....	139	78	50	35	27.8	24.1	62	46	107	63	60	Basal suture open.
Lakiundu River	182039	Male	144	87	52	33	29.9	25.7	61	48	110	66	59	Basal suture closed.
Do.	182041	...do.....	145	88	52	36	30.8	25.9	65	51	113	67	62	Do.
Do.	182051	...do.....	146	89	52	33	28.8	26.6	64	47	115	67	61	Do.
Do.	182042	Female	136	81	49	33	29.6	24.5	60	45	106	65	58	Do.
Do.	182048	...do.....	142	86	53	35	31.0	24.5	61	45	108	64	58	Do.
Do.	182049	...do.....	137	77	51	32	27.2	24.8	60	44	105	63	59	Basal suture open.

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[1] Type.

Measurements of skulls of Thos from British East Africa—Continued.

Form and locality.	No.	Sex.	Condylobasal length.	Zygomatic breadth	Mastoid breadth.	Postorbital constriction.	Interorbital constriction.	Rostral breadth over canine.	Lachrymal foramen to alveolar point.	Median length nasals.	Mandible.	Maxillary tooth row.	Lower molar—premolar row.	Observations.
T. mesomelas mcmillani—Con.														
Archer's Post	182131	Male	148	80	52	32	28.7	26.0	63	50	115	67	63	Basal suture closed.
Do.	182133	...do.	149	85	54	35	30.1	25.7	65	49	115	68	63	Do.
Do.	182132	Female	134	74	49	34	26.2	24.0	57	44	103	60	57	Basal suture open
Do.	182137	...do.	138	80	51	35	28.6	24.3	59	48	107	64	59	Basal suture closed.
Merelle Water	184809	Male	139	83	51	33	29.9	24.4	59	48	107	63	54	Do.
Do.	182076	Female	139	80	49	31	27.1	22.8	59	45	108	65	61	Do.
Do.	182077	...do.	134	77	50	31	27.0	22.6	58	44	103	61	57	Do.
Do.	182083	...do.	144	81	53	34	29.1	26.0	61	44	110	64	59	Do.
Do.	182087	...do.	137	78	49	33	28.3	23.3	60	44	106	63	58	Do.
Do.	182094	...do.	140	83	51	36	28.7	23.5	62	48	108	65	60	Do.
Koya Water	182109	Male	145	82	54	33	28.0	....	62	49	111	67	62	Do.
Do.	182112	...do.	143	80	53	33	27.0	26.2	62	51	....	66	....	Basal suture open.

External and dental measurements of adult specimens of Thos from British East Africa.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Ear from notch.	Upper carnassial.	First upper molar.	Lower carnassial.
T. adustus bweha.									
Guas Ngishu Plateau	173019	Male	....	....	....	....	13.9×7.4	11.3×13.7	15.6×5.9
Do.	173016	Female	....	....	....	....	13.7×7.0	11.6×13.4	15.7×6.3
Kisumu	[1] 182342	Male	720	310	148	90	14.3×8.4	11.0×13.4	15.9×6.8
Do.	182343	.....do.	667	340	152	86	14.1×7.0	12.2×14.2	15.8×6.3
Do.	182348	.....do.	690	330	150	80	13.2×7.2	11.6×13.2	15.6×6.8

T. adustus notatus.									
Nairobi	168137	Male					14.1×6.6	11.5×13.2	15.1×5.6
Loita Plains	181488	Female	690	345	160	78	13.4×6.4	10.7×13.1	15.5×6.7
T. aureus bea.									
Loita Plains	[1] 163904	Female	640	275	140	99	15.0×8.0	11.5×13.6	17.3×6.8
Naivasha	162139	Male					15.9×8.0	11.7×13.0	17.8×7.0
Suswa Plains	182007	Female					14.8×8.2	10.7×12.6	17.2×7.1
Kasorongai River	163293	do	680	300	160		15.7×8.1	11.2×13.4	16.8×6.5
Do	163301	do	682	234	154		14.8×8.4	10.5×13.7	16.9×6.8
Oni	163302	do	666	239	149		14.6×7.9	10.6×12.2	15.8×6.5
Laikipia	164698	do	650	350	155	95	15.3×7.8	11.6×14.1	16.4×6.8
T. mesomelas elgonæ.									
Guas Ngishu Plateau	[1] 164699	Male	600	325	150	100	16.5×7.8	11.1×15.1	17.3×6.5
Do	173017						15.9×8.1	11.4×14.7	
Do	173020						17.1×8.1	11.6×15.2	17.4×6.5
Do	173014						15.5×8.0	10.6×13.8	17.1×6.5
Do	173018						15.8×7.6	11.3×14.7	18.5×6.9
Do	164611	Female	640	310	146	105	14.3×7.0	9.7×13.7	16.3×6.2
Do	164614	do	700	350	152	110	15.8×7.6	10.6×14.3	17.5×6.4
Do	164752	do	650	340	150	102	16.2×7.6	11.5×14.6	17.8×6.2
T. mesomelas mcmillani.									
Taveta	18941						16.7×7.9	10.9×14.5	18.4×7.1
Mtoto Andei	[1] 181483	Female	690	350	140	95	15.0×7.4	10.6×14.2	16.1×6.2
Ulukenia Hills	164546						17.4×7.0	10.9×14.3	17.9×6.7
Loita Plains	181503	Female	680	325	145	90	15.6×7.4	10.7×14.2	16.8×7.1
Lime Springs	181490	Male	690	360	158	112	16.9×7.7	11.2×14.7	17.7×7.0
Do	181491	do	770	335	150	100	16.8×8.0	11.2×15.0	18.2×7.6
Do	181489	Female	693	345	145	100	15.8×7.2	10.4×14.2	16.6×6.9
Kabalolot Hill	181493	Male	700	305	150	110	17.0×7.8	11.6×15.1	18.0×7.2
Do	181492	Female	710	360	152	112	15.4×7.8	9.8×13.8	16.5×6.3
Do	181494	do	740	325	150	108	15.2×7.5	10.2×13.4	16.6×6.9
Telek River	181499	Male	740	365	180	110	15.2×7.4	10.9×14.1	16.7×6.7
Do	181497	Female	650	330	145	108	15.3×7.3	10.1×13.8	16.4×6.6
Do	181498	do	690	350	155	108	15.4×7.2	10.4×14.6	17.5×7.0

External and dental measurements of adult specimens of Thos from British East Africa—Continued.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Ear from notch.	Upper carnassial.	First upper molar.	Lower carnassial.
T. mesomelas mcmillani—Continued.									
Tolek River	181500	Female	710	340	146	102	16.4×7.3	10.5×14.6	18.0×7.0
Do	181501	do	730	355	158	105	15.8×7.5	10.8×14.1	16.5×6.5
So. Guaso Nyiro	162135	Male					18.0×7.9	11.3×15.0	18.5×7.6
Do	162903	do	650	295	155	100	16.9×7.9	11.0×15.0	18.2×7.2
Do	162136	Female					17.3×8.3	11.3×14.9	17.9×7.4
Lakiundu River	182039	Male	680	365	156	102	16.5×7.5	11.3×15.6	17.9×7.1
Do	182011	do	710	350	165	110	15.1×6.5	10.1×13.3	17.0×6.6
Do	182051	do	730	300	155	103	16.8×7.8	11.0×15.4	17.9×7.4
Do	182012	Female	670	340	145	100	15.8×7.1	10.2×14.5	16.1×6.5
Do	182048	do	600	360	152	108	15.9×7.2	10.1×13.8	17.3×7.3
Archer's Post	182131	Male	750	350	154	112	18.3×7.9	12.1×16.3	19.4×7.4
Do	182133	do	730	360	162	110	16.8×7.1	11.3×15.1	18.0×7.4
Do	182137	Female	680	350	150	100	14.8×6.3	10.0×13.0	16.0×6.5
Merelle Water	184809	Male	690	330	153	108	14.6×7.6	9.3×13.2	16.6×7.0
Do	182076	Female	650	340	150	100	16.4×7.8	11.2×14.8	17.4×7.2
Do	182077	do	650	380	145	100	15.3×7.8	10.8×14.0	17.2×6.4
Do	182083	do	730	380	155	115	16.2×8.1	11.9×15.7	17.9×7.6
Do	182087	do	600	330	145	105	15.7×7.3	10.7×14.6	17.4×7.0
Do	182094	do	700	300	155	103	15.1×6.9	10.0×13.4	16.3×6.9
Koya Water	182109	Male	710	390	160	110	17.0×7.8	11.2×14.8	18.7×7.1

[1] Type.

LYCAON PICTUS LUPINUS Thomas.

1902. *Lycaon pictus lupinus* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 9, p. 439. June. (Nyuki River Swamp, Rift Valley, British East Africa; type in British Museum.)

1910. *Lycaon pictus lupinus* ROOSEVELT, African Game Trails, Amer. ed., p. 473; London ed., p. 485.

1914. *Lycaon pictus lupinus* ROOSEVELT AND HELLER, Life Hist. African Game Anim., vol. 1, p. 267.

Specimens.—Eleven, from the following localities:

BRITISH EAST AFRICA: Kabalolot Hill, Sotik, 5 (Heller); Kamiti Farm, Athi Plains, 2 (Mearns); Kilima Kui, 1 odd skull (Heller); Southern Guaso Nyiro River, 1 odd skull (Mearns); Telek River, Sotik, 1 (Rainey); Ulu Station, 1 (Rainey).

A young adult female collected by Mearns at Kamiti Farm weighed 31 pounds eviscerated. Merans's catalogue records of a specimen from the Southern Guaso Nyiro: "Iris yellowish-brown; naked parts black." The hunting dog is noted for great individual variation in color and color pattern; the three colors, black, ochraceous, and white, are not distributed exactly alike in any two skins. Examination of the series listed above, however, makes me believe that while a certain amount of what might be termed true "individual" variation really does occur, the immense differences between most of the animals can be explained by condition of pelage, rather than by genuine individual variation. Aside from irregularity in the white patches, which is a common condition in many mammals, the black and ochraceous areas are to a considerable degree regular in outline if the animal is in perfect coat. This does not often occur, apparently, as the skins in our series are in all stages of moult and renewal, though all were taken in two months, May and September.

> This pied creature is found throughout East Africa, although it is rare in most places. Hunting dogs usually go in big packs. They master all the smaller and the young of all the larger antelopes, and there is reason to believe that at times, although rarely, they kill even the biggest antelope and half-grown buffalo also. Yet we saw zebras feeding near them without heeding them, and also rushing at them and driving them off when they came too close. They are extremely destructive to game, and at times to goats and sheep; and they will menace man, although we have no authentic instance of their actually attacking him. But Mr. Rainey, in the Northern Guaso Nyiro desert, saw a party of wild dogs chasing a lion; they did not bite him, but he was manifestly uneasy and concerned and trotted sheepishly along, endeavoring to get out of their way. (Roosevelt and Heller, Life Hist. African Game Anim., vol. 1, pp. 266, 267.)

Heller's field notes of the Rainey Expedition state that a hunting dog was trapped at Merelle Water and kept alive. The howling of the captive later atttracted a band of 11 wild dogs to within 300 yards of the camp at Quoy. In this band 10 were quite blackish and one much lighter in color. At Longaya Water the members of the expedition saw wild dogs run a dik-dik at midday.

For measurements of specimens see page 110.

Measurements of skulls of Lycaon pictus lupinus from British East Africa.

Locality.	No.	Sex.	Condylobasal length.	Zygomatic breadth	Mastoid breadth	Postorbital constriction.	Interorbital constriction.	Rostral breadth over canine.	Lachrymal foramen to alveolar point.	Median length nasals.	Mandible.	Maxillary tooth row.	Lower molar premolar row.	Observations.
Kabalolot Hill	181508	Male	195	132	76	42	41	51	88	63	156	86	81	Basal suture closed.
Do	181509	...do	190	129	71	43	39	50	84	57	151	84	81	Basal suture open.
Do	181512	...do	195	137	76	41	41	51	87	63	157	86	83	Basal suture closed.
Do	181510	Female	190	129	73	41	42	50	84	55	149	84	79	Do.
Do	181511	...do	191	128	74	42	41	49	85	57	151	84	80	Do.
Telek River	181513	Male	181	121	70	42	37	46	79	57	141	77	74	Basal suture open.
So. Guaso Nyiro	162878		189	126	72	42	41	47	84	61	148	82	76	Basal suture closed.
Kilima Kui, Kapiti	161908		192	131	77	44	43	48	85	59	152	82	81	Do.
Kamiti	163290		183	126	70	39	42	44	80	58	142	78	76	Do.
Do	163291	Female	174	113	70	43	37	44	78	47	139	77	76	Basal suture open.

External and dental measurements of specimens of Lycaon pictus lupinus from British East Africa.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Ear.	Upper carnassial.	First upper molar.	Lower carnassial.
Kabalolot Hill	181508	Male	960	410	233	135	22.2×11.5	16.8×18.7	27.0×10.7
Do	181509	....do	1040	370	230	132	22.2×10.8	16.3×19.4	26.4×10.4
Do	181512	....do	970	380	235	135	21.1×11.2	16.3×17.8	25.3×10.2
Do	181510	Female	1050	350	220	135	20.7×11.3	15.9×19.1	24.9×9.6
Do	181511	....do	970	375	220	135	20.6×10.6	16.2×18.1	25.1×9.5
Telek River	181513	Male	.....	.....	.....	.....	19.7×11.1	14.8×17.3	22.9×8.9
So. Guaso Nyiro	162878	.....	.....	.....	.....	.....	21.4×11.3	15.5×18.5	24.9×9.4
Kilima Kui, Kapiti	161908	.....	.....	.....	.....	.....	20.9×11.8	16.4×18.3	25.1×10.2
Kamiti	163290	.....	.....	.....	.....	.....	20.1×11.0	15.3×18.0	24.3×9.7
Do	163291	Female	925	345	230	120	20.6×10.8	16.3×18.8	24.4×9.0

Genus OTOCYON Müller.

1836. *Otocyon* MÜLLER, Archiv. Anat. & Phys. Med., p. L. (*O. megalotis.*)

The great-eared "fox" is represented in the East African collections by two closely related forms, which later doubtless will prove, with *Otocyon megalotis* of South Africa, to be geographic races of a single species.

OTOCYON CANESCENS Cabrera.

1910. *Otocyon canescens* CABRERA, Ann. and Mag. Nat. Hist., ser. 8, vol. 6, p. 462. November. (Burao, Somaliland; type in British Museum.)

Specimen.—One imperfect skin from—

ABYSSINIA: Adis Ababa (Philip).

OTOCYON VIRGATUS Miller.

Plates 22, 23, 24.

1892. *Otocyon megalotis* TRUE, Proc. U. S. Nat. Mus., vol. 15, p. 455. (Not of Desmarest.)

1909. *Otocyon virgatus* MILLER, Smithsonian Misc. Coll., vol. 52, p. 485. December 18. (Naivasha Station, British East Africa; type in U. S. Nat. Mus.)

1910. *Otocyon virgatus* ROOSEVELT, African Game Trails, Amer. ed., pp. 473 and 486;[1] London ed., pp. 485 and 497.[1]

Specimens.—Seventeen, from localities as follows:

BRITISH EAST AFRICA: "British East Africa," 1 skull (S. A. Ex.); Engare Narok River, 1 (Rainey); Lakiundu River, 1 (Heller); Loita Plains, 1 (Heller); Naivasha Station, 8 (Mearns, Loring); Southern Guaso Nyiro River, 1 (Rainey); Taveta, 1 (Abbott); Telek River, 1 (Rainey).

GERMAN EAST AFRICA: Aruscha Wa-cini, 2 (Abbott).

Mearns and Loring record the following weights of specimens collected at Lake Naivasha: Males, old adult (type), 8½ pounds; young adult, 6½ pounds. Females, two adults, each 6½ pounds. Doctor Abbott's labels on the specimens from the Kilimanjaro region record the native Kichaga name of the animal as *Kipara*. Loring's notes on the species at Naivasha are in part as follows:

> All of the specimens secured were taken by "jacking" at night, although, while traveling over the Uganda Railroad, we frequently saw them singly or in pairs in broad daylight. The white people knew nothing of a fox in this country, and had always called them "jackals." They seemed to live in pairs and groups of three to six. On dark nights it was usually easy to shine their eyes and approach within shooting range. Often the foxes would slink about for some time before we got within gunshot range. Frequently we saw two and sometimes three and four standing so close together that it was surprising that the spread of the shot did not kill more than one. One evening Dr. Mearns and I started out about 9 o'clock and returned about midnight. Most of the hunting was done on an elevated brushy plateau, within short distance of a native village, where the occupants were singing, dancing, and playing their crude stringed instruments. We ran into a bunch of five of these foxes and got four of them, none of which was the young of the year. One fox was killed

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[1] "*virgartus.*"

within 200 yards of the railroad station, and at dusk one evening I saw a fox emerge from a burrow close to a group of natives and scamper across the flat. The stomachs of several were examined and found to contain about a quart of termites and other insects. (Roosevelt's African Game Trails, Appendix C, pp. 486–487.)

As will be seen from the accompanying table of measurements, there is considerable variation in size and proportions of the skull and teeth in this series of *Otocyon* from British East Africa. Conclusions based on so small a series of each form as examined and measured by Cabrera [1] would not seem to be of much value; and, although the three forms recognized will doubtless prove to differ sufficiently in color so that they may be retained as subspecies of *megalotis*, the characters of size and proportions of skull are of little or no use in differentiating the forms. Good series of skins and skulls from Abyssinia, Somaliland, and South Africa are now much needed to work out the relationships between these forms, as well as the real characters which distinguish them one from another.

For measurements see table, page 113.

Family MUSTELIDÆ.

Genus MELLIVORA Storr.

1780. *Mellivora* Storr, Prodr. Meth. Mamm., tab. A. (*M. capensis.*)

Several forms of the honey-badger have been named from various parts of Africa. These have been for the most part based on single specimens or very small series, and until suitable collections of skins and skulls are assembled for serious monographic work the status of several named species is perhaps uncertain. On geographic grounds alone it would seem that most of the named forms must stand in the final revision. The two species listed below, on the basis of the limited material at hand, seem distinct and well marked.

MELLIVORA ABYSSINICA Hollister.

Plate 25.

1910. *Mellivora abyssinica* Hollister, Smithsonian Misc. Coll., vol. 56, No. 13, p. 1. October 10. (Suksukki River, Abyssinia; type in U. S. Nat. Mus.)

1911. *Mellivora abyssinica* Hollister, Proc. Biol. Soc. Washington, vol. 24, p. 37. February 24.

Specimen.—One, the type, as follows:

Abyssinia: Suksukki River, 1 (Philip).

In the original account of this species the type locality was given as "vicinity of Adis Ababa," Abyssinia. Later information received from the collector, the Hon. Hoffman Philip, gives the exact locality where the specimen was killed as near the "Suksukki River, a small stream which connects Lake Zwai with Lake Horo Schalo, about

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 6, p. 463. November, 1910.

Measurements of specimens of Otocyon virgatus.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Rostral breadth over canine.	Lachrymal foramen to alveolar point.	Maxillary tooth row.	Width of m¹.	Lower tooth row from canine.	Observations.
B. E. A.:														
Lakiundu River	182031	Male	470	310	120	107	57	44	17	44	44	6.5	50	Basal suture open.
Lake Naivasha	162120	...do	560	270	130	106	58	42	18	41	41	6.3	48	Do.
Do	162122	...do	520	175	132	105	60	45	19	42	41	6.3	48	Do.
Do	162125	...do	....	....	....	105	62	47	18	42	41	6.5	48	Basal suture closed.
Do	[1] 162126	...do	550	281	137	113	65	48	19	47	45	6.4	52	Do.
Do	162127	...do	531	292	127	108	59	45	18	44	43	6.2	49	Basal suture open.
Do	162121	Female	540	270	125	105	58	45	17	41	41	6.3	48	Do.
Do	162123	...do	520	270	120	102	59	43	17	42	41	6.4	47	Do.
Do	162124	...do	525	275	120	....	....	....	....	42	41	6.4	47	Teeth moderately worn.
Telek River	181502	...do	500	280	108	106	57	42	17	43	42	6.4	48	Basal suture open.
Ngare Narok River	181485	Male	480	280	115	105	63	46	18	43	40	6.5	48	Basal suture closed.
Southern Guaso Nyiro	181487	...do	....	....	....	105	62	45	18	43	41	6.5	47	Do.
Loita Plains	181506	....	....	....	....	99	59	43	17	38	38	6.5	45	Do.
Taveta	35099	....	....	....	....	109	63	45	19	45	43	6.9	49	Do.
G. E. A.: Aruscha Wa-cini	38694	Male	....	....	....	110	63	47	19	45	44	6.0	49	Do.
Do	38695	Female	....	....	....	107	60	45	18	45	43	6.5	50	Do.

[1] Type.

midway between the two lakes, which, with others, lie between 7° and 8° north latitude and between 38° and 39° longitude east. Altitude, 4,500 to 5,000 feet."

MELLIVORA SAGULATA Hollister.

Plates 26, 27.

1892. *Mellivora capensis* TRUE, Proc. U. S. Nat. Mus., vol. 15, p. 455. (Not of Schreber.)

1910. *Mellivora ratel* ROOSEVELT, African Game Trails, Amer. ed., p. 473; London ed., p. 485. (Not of Sparrman.)

1910. *Mellivora sagulata* HOLLISTER, Smithsonian Misc. Coll., vol. 56, No. 13, p. 2. (Mount Kilimanjaro, German East Africa; type in U. S. Nat. Mus.)

Specimens.—Four, from localities as follows:

BRITISH EAST AFRICA: Mau Hills, 15 miles north of Ravine Station, 1 (K. Roosevelt); Nairobi, 2 (Heller, Turner).

GERMAN EAST AFRICA: Mount Kilimanjaro, 5,000 feet altitude, 1 (Abbott).

Variations in color, which have been used in differentiating forms of honey-badgers, are probably of less importance than skull characters. There appears to be considerable seasonal or pelage difference in the intensity of the white side stripe; and color of mantle is perhaps largely influenced by season, wear, or stain from soil. All the recognizable forms will doubtless prove to be merely geographic races of the Cape species, *Mellivora capensis*.[1]

Genus ICTONYX Kaup.

1835. *Ictonyx* KAUP, Das Thierreich, vol. 1, p. 352. (*I. striatus*.)[2]

1906. *Ictonyx* HOWELL, Proc. Biol. Soc. Washington, vol. 19, p. 46. February 26.

A single form of the striped muishond is included in the collection. Other races have been named from the Upper Nile, Sudan, and Abyssinia.

ICTONYX STRIATUS ALBESCENS Heller.

Plate 11, figs. 3, 4, 5.

1913. *Ictonyx capensis albescens* HELLER, Smithsonian Misc. Coll., vol. 61, No. 13, p. 13. September 16. (Mount Lololokwi, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Four, from localities as follows:

BRITISH EAST AFRICA: Kapiti, 1 (Johnston); Mount Lololokwi, 1 (Heller); Nairobi, 1 (Klein); Ulukenia Hills, 1 (Loring).

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[1] This name has priority over *M. ratel;* see Hollister, Proc. Biol. Soc. Washington, vol. 25, p. 96. May 4, 1912.

[2] *Bradypus striatus* Perry, Arcana or The Museum of Natural History, part 11, pl. [41] and text. November, 1810. See Hollister, Proc. Biol. Soc. Washington, vol. 28, p. 184. November 26, 1915.

Genus AONYX Lesson.

1827. *Aonyx* Lesson, Man. Mamm., p. 157. (*A. capensis.*)

In addition to the two races of the Cape clawless otter listed below, a third subspecies, *Aonyx capensis meneleki* (Thomas) has been described from Zegi, Lake Tsana, Abyssinia.

AONYX CAPENSIS HINDEI (Thomas).

1905. *Lutra capensis hindei* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 15, p. 78. (Fort Hall, British East Africa; type in British Museum.)

Specimen.—One, as follows:

British East Africa: Thika River (Turner).

This animal, a female topotype specimen of the race, measured fresh: Head and body, 690 mm.; tail, 465; hind foot, 140; ear, 20. It was killed by natives and received fresh by Mr. Turner.

AONYX CAPENSIS HELIOS Heller.

Plates 28, 29.

1913. *Aonyx capensis helios* Heller, Smithsonian Misc. Coll., vol. 61, No. 19, p. 1. November 8. (40 miles southwest of Kericho, Sotik District, British East Africa; type in U. S. Nat. Mus.)

Specimen.—One, as follows.

British East Africa: Sotik, 40 miles southwest of Kericho (Turner).

The characters separating this race from *Aonyx capensis hindei* are slight, and much more material is needed to determine its status satisfactorily. As with the ratels, sufficient series must be assembled from various regions so that the real geographic characters may be distinguished from purely individual differences. Colonel Roosevelt saw several otters while hunting hippopotamuses in Lake Naivasha,[1] and great efforts should be made by sportsmen and travelers to collect skins and skulls and deposit them in museums.

Family VIVERRIDÆ.

Genus VIVERRA Linnæus.

1758. *Viverra* Linnæus, Syst. Nat., ed. 10, p. 43. (*V. zibetha.*)

1915. *Civettictis* Pocock, Proc. Zool. Soc. London, p. 134. March. (*V. civetta.*)

The African civet was first described by Schreber from "Guinea, Congo, the Cape of Good Hope, and Ethiopia."[2] A form from Zanzibar was described by Matschie in 1891, and in "Die Säugethiere Deutsch-Ost-Afrikas" the distribution of this new species was given to include the Kilimanjaro region. It would seem on geographical grounds that our single specimen should be referred to this form.

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[1] African Game Trails, p. 214. 1910.

[2] Schreber, Säugthiere, vol. 3, pp. 418–420. 1778.

Mr. Pocock has separated the African civet from the Oriental species under the new generic name *Civettictis*. While admitting the importance of the characters he has discovered in this connection, I should prefer to recognize the two groups as subgenera, rather than full genera, until he can study fresh material of all the species.

VIVERRA CIVETTA ORIENTALIS Matschie.

1891. *Viverra civetta orientalis* MATSCHIE, Archiv. f. Naturg., p. 352. (Zanzibar Island; type in Berlin Museum.)

Specimen.—One, as follows:

BRITISH EAST AFRICA: Voi (Heller).

The following manuscript notes on the type-specimen of this form were made by Heller at the Berlin Museum:

> Type A5329, Zanzibar Id. (Coll. Hildebrandt); skin mounted; young, the skull with last molar not in place. Color of upperparts chiefly whitish silvery, black spots on sides smaller than white interspaces and not well defined; black of mane also flanked by broad white stripes. Arm, foot, and throat black; head with whole crown and tip of snout whitish, sides of face and band across before eyes black. Color much lighter than the mainland skins I have seen. Skull with all sutures open, last lower and upper molars not yet erupted. Condyloincisive length, 140; zygomatic breadth, 67; interorbital breadth, 25; postorbital breadth, 22.4; nasals 35.5 × 14, length upper carnassial, 11.6; mandible 102.

The skin from Voi is without a skull but is apparently adult. It is, I should judge, somewhat darker than the type, and the spots on the sides of the body are well marked and conspicuous against the whitish background; the long hairs of the dorsal mane are decidedly ochraceous and tipped with glossy black; the legs, feet, and terminal half of the tail are brownish black; shoulders grizzly, mixed black and gray or whitish, the spotting not distinct; crown buffy, mixed with blackish and sides of nose white. This skin is conspicuously different from skins in the museum collected in Congo and Cameroons. It is much lighter in color, the underparts whitish or light gray instead of blackish. On the entire sides and upperparts the white predominates, the black spots being much smaller, though more sharply marked, than in the West African skins.

Genus GENETTA Oken.

1816. *Genetta* OKEN, Lehrb. Naturg., 3ter Theil, 2te Abth., p. 1010. (*G. genetta.*)

On account of the very great amount of individual variation in color and color pattern, the genets are difficult mammals to determine satisfactorily without suitable series for study. Three general types are represented in the collections, and the material has usually been sufficient for definite identifications. The *dongalana* group is characterized by the distinct dorsal mane and long-haired tail; the smaller *bettoni* by the absence of a distinct dorsal stripe and the very narrow light tail rings; and the *stuhlmanni* group by the dark dorsal stripe without mane, and comparatively short-haired tail. The pygmy *Genetta pumila* is a member of the latter group. A very large species, *Genetta victoriæ* Thomas, described from Entebbe, Uganda, and later recorded from the Congo forest near Ruwenzori, is not represented in our collections.

For tables of measurements of specimens of genets see pages 121-123.

GENETTA DONGALANA NEUMANNI Matschie.

1902. *G*[*enetta*] *neumanni* MATSCHIE, Verhandl. des V. Internat. Zool.-Congr. Berlin, p. 1140. (Irangi, German East Africa; type in Berlin Museum.)

Specimens.—Eleven, from localities as follows:

UGANDA: "Uganda," 1 (Rosenberg).

BRITISH EAST AFRICA: Engare Ndare River, 1 (Heller); Isiola River, 1 (Heller); Lakiundu River, 1 (Heller); Merelle Water, 3 (Heller); Ulukenia Hills, 1 (Loring); Voi, 3, including 2 large embryos (Heller).

Heller in his field catalogue records the stomach contents of various specimens as follows: Isiola River, July 2, remains of a *Saccostomus;* Merelle Water, July 25, one with remains of sand grouse and a centipede and another beetles; Voi, November 20, spiders and grasshoppers. The Voi specimen contained two large embryos, November 20, size of small rats.

I find no appreciable color differences between specimens from Voi and Ulukenia Hills, which must represent Matschie's *neumanni*, and specimens from the Marsabit country north of Kenia. The Voi skull has slightly larger auditory bullæ than the northern skulls, but there is considerable variation in this feature among the Marsabit and Northern Guaso Nyiro specimens. No material representing Neumann's *Genetta hararensis*[1] described from Harar, Abyssinia, is available. Neither does the museum possess specimens of true *dongalana*[2] from Nubia. I am therefore unable to satisfy myself regarding the distinctness of these forms. The characters given by Matschie, in his key to the species, to separate *dongalana* from *neumanni* are all absolutely valueless; the relative breadth of the light and dark rings on the tail differs in specimens collected the same day in the same camp and is greatly changed temporarily by renewal from the old long coat into fresh hair. This is well shown by our material. The numbers of dark and light rings on the tail are easily miscounted, and two persons will frequently count them differently on the same skin, owing to the obscurity of the dark basal rings, which may or may not be counted. Doubtless careful study of suitable series of each form from the type regions will reveal characters of more importance, as it is hard to believe the animal ranges unchanged throughout this great region.

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[1] Sitz.-ber. Ges. nat. Freunde Berlin, 1902, p. 183. November.

[2] *V*[*iverra*] *dongalana* Hemprich and Ehrenberg, Symbolae Physicæ, pt. 1, dec. 2, text of *Herpestes leucura* p. 6. 1832.

The following manuscript notes on the type specimen of *Genetta dongalana neumanni* were made by Heller in Berlin:

> Type of *Genetta neumanni* Matschie; Irangi, ♀, A5576, O. Neumann; skin stuffed; skull perfect. Black dorsal mane; body spots russet; tail with seven black rings [original description says nine], tip blackish but apparently part of end is gone. Skull condylo-incisive length, 92 millimeters; zygomatic breadth, 45; interorbital breadth, 14.2; postorbital breadth, 15; nasals 23.3 × 8; length of upper tooth row, including canine, 36; length of mandible, 65.

The specimen listed above from "Uganda" is a mounted skin with skull. It is very young, still in the milk dentition, and is therefore identified only provisionally with *neumanni*. The specimen was purchased from W. F. H. Rosenberg, and is without definite data.

GENETTA BETTONI Thomas.

1902. *Gennetta bettoni* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 9, p. 365. (Lagari, Mau District, south of El Burgon Range, British East Africa; type in British Museum.)

Specimens.—Two, from the following localities:

British East Africa Kakumega River, 1 (Heller); Lukosa River, 1 (Heller).

The stomach of the specimen trapped at the Kakumega River contained insects and mice. The Lukosa River skin was purchased from a native.

GENETTA STUHLMANNI STUHLMANNI Matschie.

1892. *Genetta pardina* True, Proc. U. S. Nat. Mus., vol. 15, p. 454. (Part, specimens from Mount Kilimanjaro; not of Geoffroy.)

1902. *G[enetta] stuhlmanni* Matschie, Verhandl. des V. Internat. Zool.-Congr. Berlin, p. 1142. (Bukoba, German East Africa; type in Berlin Museum.)

1910. *Genetta bettoni* Roosevelt, African Game Trails, Amer. ed., p. 473; London ed., p. 485. (Not of Thomas.)

Specimens.—Twenty-nine, from localities as follows:

Uganda: Nkyanuna, 1 (Heller); Ruwenzori East, 1 (Dent).

British East Africa: Kabalolot Hill, Sotik, 1 (Heller); Kaimosi, 4 (Heller); Lake Naivasha, 4 (Heller); Lukosa River, 5 (Heller); Mount Kenia, west side at 8,500 feet, 7 (Loring, Mearns); Mount Lololokwi, 1 (Heller); Nzoia River, Guas Ngishu Plateau, 1 (Heller); Telek River, Sotik, 1 (Heller).

German East Africa: Mount Kilimanjaro, at 5,000 feet, 3 (Abbott).

A female of this *Genetta* collected at Lukosa River, February 11, contained two embryos. Heller found the stomachs of the Lukosa River specimens filled with frogs and birds; one stomach held seven frogs.

I am unable to discover geographical variation of any consequence over all the region represented by the above listed material. There is, as usual in *Genetta*, an immense amount of individual variation in color and color pattern, but on the whole the series is readily distinguishable from the eastern *erlangeri* by darker appearance and considerably darker tail. The specimens from Lake Naivasha and the Sotik average a little larger in size than those from other places, and have broader skulls, but the difference is of little consequence. One melanistic specimen, in which the pattern of the markings is faintly shown, is in the Mount Kenia series.

There are plainly two geographic races of this species in the collection. As shown by our material, true *stuhlmanni* ranges east to Kenia and Kilimanjaro, where it gives way to the next form, *erlangeri*. No specimens from the actual coast strip, including the type-locality of *Genetta suahelica* Matschie, are in the collection.

Inasmuch as no description of the actual type-specimen of *Genetta stuhlmanni* was given by Matschie, the following notes made by Heller in Berlin are interesting:

Genetta stuhlmanni Matschie. Type A5577; Bukoba; skull A5578; occipital region cut away, not old, maxillary-palatine suture still open. Skin stuffed; color of dorsal stripe and spots same as *suahelica*. Skull: Length postglenoid process to incisors, 58.3; zygomatic breadth, 41; interorbital breadth, 11.5; post-orbital breadth, 11.5; upper tooth row including canine, 33; nasals, 16 × 7.5; length of mandible, 57; palatal length, 41.

GENETTA STUHLMANNI ERLANGERI Matschie.

1892. *Genetta pardina* TRUE, Proc. U. S. Nat. Mus., vol. 15, p. 454. (Part, specimens from Taveta; not of Geoffroy.)

1902. *G[enetta] erlangeri* MATSCHIE, Verhandl. des V. Internat. Zool.-Congr. Berlin, p. 1143. (Kitui, British East Africa; type in Berlin Museum.)

Specimens.—Twenty, from localities as follows:

BRITISH EAST AFRICA: Maji-ya-chumvi, 4 (Heller); Mariakani, 1 (Heller); Mount Mbololo 4, (Heller); Mtoto Andei, 3 (Heller); Ndi, 1 (Heller); Taveta, 3 (Abbott); Ulukenia Hills, 2 (Loring); Voi, 2 (Heller).

While certain skins in this series approach in color some specimens of *stuhlmanni*, the series as a whole is remarkably pale colored; the ground color of the body decidedly buff or yellowish-buff, and the dark tailrings reddish rather than seal-brown or blackish. The form represented seems clearly entitled to recognition as a subspecies. The distribution merges into, rather than overlaps, that of *stuhlmanni*.

The following notes on the type-specimen were made by Heller in Berlin:

Genetta erlangeri. Type, A2170; Kitui, Ukamba; Hildebrandt, collector; skin mounted, skull perfect. Color—light reddish type of *Genetta*, the dorsal stripe russet and same color as the spots on back and sides; ground color everywhere buffy; tail rings darker but still chocolate brown, not seal brown. Skull number 6333—condylo-incisive length, 90; zygomatic breadth, 45; interorbital width, 13.4; postorbital width, 9.2; nasals, 19 + × 7.5; upper tooth row including canine, 35; mandible length, 63.

We have no specimens from within the coast strip region from which Matschie described still another form, *Genetta suahelica*.[1]

Heller's notes taken on the type-specimen of this race in Berlin are as follows:

Genetta suahelica Matschie. Type, ♀ A6577, Tanga, German East Africa; O. Neumann. Skin stuffed, skull perfect. Color, dorsal stripe black, spots on back and sides with russet centers and seal-brown margins; ground color buffy. Very close in color to Nairobi forest specimens. Skull: condylo-incisive length, 88; zygomatic width, 48; interorbital width, 14; postorbital width, 12; nasals, 20.5 × 8; upper tooth row including canine, 33.2; mandible length, 60.

GENETTA PUMILA Hollister.

Plate 30.

1916. *Genetta pumila* Hollister, Smithsonian Misc. Coll., vol. 66, No. 1, p. 4, February 10. (Mount Gargues, British East Africa; type in U. S. Nat. Mus.)

Specimen.—One, as follows:

British East Africa: North Creek, Mount Gargues, at 6,000 feet (Heller).

This pygmy form of the *stuhlmanni* group is recognizable from other East African genets by size alone. It is known only from the type-specimen which was captured by the Rainey expedition of 1911.

Genus NANDINIA Gray.

1843. *Nandinia* Gray, List. Mamm. Brit. Mus., pp. xx and 54. (*N. binotata*.)

Although forms of the African palm civet were known from Mount Kilimanjaro and Ruwenzori, the specimens constituting the type series of Heller's new subspecies, listed below, were the first to be recorded from British East Africa.

NANDINIA BINOTATA ARBOREA Heller.

Plate 31.

1913. *Nandinia binotata arborea* Heller, Smithsonian Misc. Coll., vol. 61, No. 13, p. 9. September 16. (Lukosa River, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Three, from the following localities:

British East Africa: Kaimosi, 1 (Heller); Kakumega, 1 (Heller); Lukosa River, 1 (Heller).

The specimen from Kaimosi is immature. The measurements of the adult male type from Lukosa River and the adult female from Kakumega are: Head and body, 550, 490; tail vertebræ, 625, 570; hind foot, 95, 80; ear, 38, 38; condylobasal length of skull, 106, 96;

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[1] Verhandl. des V. Internat. Zool.-Congr. Berlin, p. 1143. 1902.

Measurements of adult specimens of Genetta.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Interorbital breadth.	Lachrymal foramen to alveolar point.	Maxillary tooth row.	Length upper carnassial.	Lower tooth row, canine—m_1.	Observations.
G. d. neumanni.														
B. E. A.:														
Merelle Water	182702	Male	470	450	80	88	47	28.6	13.7	28.1	36.2	8.0	39.7	Teeth moderately worn.
Do	182206	Female				86	44	27.5	13.2	27.4	35.5	8.0	38.6	Do.
Lakiundu River	182052	...do	470	470	85	88	45	27.5	13.0	27.3	35.2	7.9	38.0	Do.
Isiola River	182021	Male	470	460	84	90	46	28.2	13.0	28.1	35.7	8.9	39.6	Do.
Engare Ndare River	184798	...do				89	46	28.2	14.2	27.4	35.3	7.8	38.8	Do.
Uhukenia Hills	164150	Female	454	430	84	88	43	28.7	12.8	26.8	35.6	7.4	37.7	Teeth considerably worn.
Voi	182258	...do	440	475	79	89	45	28.4	13.1	27.9	35.4	7.8	38.4	Teeth moderately worn.
G. bettoni.														
B. E. A.: Kakumega	182700	Female	450	390	78	84	42	26.7	12.5	24.3	32.3	7.4	35.6	Teeth moderately worn.
G. s. stuhlmanni.														
Uganda: Nkyanuna	164583	Female	460	425	82	87	44	27.6	11.9	25.6	32.2	7.2	34.9	Teeth moderately worn.
B. E. A.:														
Kaimosa	182344	Male	470	415	83	88	44		12.2	25.6	33.8	8.4	38.2	Do.
Do	182345	...do	470	420	78	89	44	28.5	12.9	26.8	32.5	7.3	35.0	Teeth considerably worn.
Do	182706	...do	480	410	88	91	44	29.1	12.0	27.3	33.7	8.3	37.0	Teeth moderately worn.
Do	182709	...do	465	415	83					25.4	32.8	7.5	36.1	Do.
Lukosa River	182358	...do	460	420	85	85	41	27.2	11.6	25.2	32.3	7.3	34.8	Do.
Do	182360	...do	470	410	79	86	42	26.6	11.2	25.5	33.4	8.2	36.9	Do.

Measurements of adult specimens of Genetta—Continued.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Interorbital breadth.	Lachrymal foramen to alveolar point.	Maxillary tooth row.	Length upper carnassial.	Lower tooth row, canine —m_2.	Observations.
G. s. stuhlmanni—Continued.														
B. E. A.—Continued.														
Lukosa River	182380	Male	440	410	82	85	....	....	11.0	24.2	31.5	7.6	34.6	Teeth moderately worn.
Do	182379	Female	440	400	77	83	....	27.3	11.7	24.7	....	7.4	33.9	Do.
Do	182381	...do	430	380	77	83	43	27.2	11.8	24.2	....	7.6	34.3	Teeth much worn.
Lake Naivasha	162908	Male	490	460	84	90	47	31.1	13.4	26.8	34.1	8.2	37.1	Teeth moderately worn.
Do	162909	...do	495	460	85	90	49	28.7	14.4	28.2	34.8	8.4	37.9	Do.
Do	162910	...do	480	450	85	87	46	28.2	12.8	25.7	33.0	8.2	35.9	Do.
Do	162911	...do	485	470	87	88	46	28.9	12.6	26.5	33.8	8.6	37.3	Do.
Telek River	181549	Female	450	445	82	87	44	28.2	13.1	26.7	33.6	8.5	37.4	Do.
Kabalolot Hill	181547	Male	500	450	90	91	48	28.8	13.5	27.3	34.1	8.4	36.8	Teeth much worn.
Mount Lololokwi	182705	...do	395	400	77	79	40	25.9	10.9	23.8	31.7	7.8	34.9	Teeth moderately worn.
Mount Kenia	164143	...do	485	400	78	85	42	26.3	11.8	26.5	33.2	8.1	36.8	Do.
Do	164144	...do	465	406	80	84	44	26.7	12.0	25.6	32.7	7.5	35.8	Do.
Do	164148	...do	445	380	89	88	48	29.8	13.6	26.8	33.5	7.8	36.9	Do.
Do	164149	...do	444	422	87	83	40	27.0	11.3	25.5	33.1	7.6	35.5	Teeth unworn.
Do	164145	Female	447	390	82	84	46	27.7	13.2	24.7	32.1	7.8	35.1	Teeth moderately worn.
Do	164147	...do	427	383	78	81	42	26.5	11.2	24.0	32.2	7.4	34.8	Do.
G. E. A.:														
Mount Kilimanjaro	38254	...do	....	....	....	85	45	27.4	12.6	26.0	32.2	7.8	35.6	Do.
Do	38255	...do	....	....	....	86	44	27.5	12.6	26.5	33.1	8.1	36.4	Do.
Do	38256	...do	....	....	....	....	....	....	11.7	25.3	33.4	8.2	35.4	Teeth unworn.

G. s. erlangeri.															
B. E. A.:															
Mtoto Andei	181545	Male	420	390	70	81	44	26.6	12.5	24.6	30.4	7.6	34.5	Teeth moderately worn.
Do	181548	..do	420	410	78	82	45	26.7	12.1	21.5	32.1	8.3	35.5	Teeth considerably worn.
Do	181546	Female	440	400	76	83	42	26.7	11.7	25.0	33.0	8.4	35.9	Teeth moderately worn.
Mount Mbololo	182236	Male	450	390	78	88	46	27.9	12.6	26.9	35.0	7.7	37.6	Do.
Do	182237	..do	435	375	68	83	42	26.9	12.9	26.0	33.1	8.5	36.1	Teeth little worn.
Voi	182706	..do	440	425	76	84	43	27.7	13.3	26.6	32.0	7.1	35.0	Teeth moderately worn.
Do	182226	Female	420	380	73	80	40	24.9	11.4	25.0	31.2	7.4	34.2	Teeth little worn.
Maji-ya-chumvi	182264	Male	540	425	79	87	44	27.2	12.6	26.4	32.0	7.4	36.0	Teeth moderately worn.
Do	182265	Female	480	405	80	....	44	....	12.8	27.3	33.3	7.8	36.9	Do.
Do	182266	..do	440	405	77	84	46	26.8	13.1	24.6	31.8	8.0	35.0	Do.
Do	182270	..do	475	405	80	87	46	27.7	13.4	26.2	33.3	7.8	36.4	Teeth much worn.
Mariakani	182292	Male	500	430	85	91	48	28.6	13.2	27.7	34.3	8.5	38.3	Teeth moderately worn.
Taveta	35096	....	....	....	....	82	42	28.2	12.2	25.6	....	8.2	....	Teeth unworn.
Do	35097	....	....	....	....	88	44	28.6	12.4	26.8	32.8	7.7	35.7	Teeth moderately worn.
Do	35098	....	....	....	....	88	45	27.7	12.8	26.8	32.9	7.4	36.2	Do.
G. pumila.															
B. E. A.: Mount Gargues	[1] 182704	Male	380	355	76	75	38	24.6	10.0	23.3	29.5	7.0	32.6	Do.

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[1] Type.

zygomatic breadth, 62.6, 56.1; interorbital breadth, 19.5, 18.3; postorbital breadth, 15.8, 14.6; mastoid breadth, 41.7, 38.1; lachrymal foramen to alveolar point, 35.7, 31.4; greatest length nasals, 27.3, 26.1; upper tooth row, including canine, 37.2, 34.1; upper carnassial, 7.6 × 5.4, 7.4 × 5.2; length of mandible, 75.4, 70.6; lower tooth row, including canine, 41, 37.9.

Genus MUNGOS Geoffroy and Cuvier.

1795. *Mungos* Geoffroy and Cuvier, Mag. Encycl., vol. 2, p. 187. (*M. mungo.*)
1799. *Ichneumon* Lacépède, Tab. Div., Ord. Gen. Mamm., p. 7, (*M. ichneumon.*)
1811. *Herpestes* Illiger, Prodr. Syst. Mamm. et Avium, pp. 135, 202. (*M. ichneumon.*)
1865. *Calogale* Gray, Proc. Zool. Soc. London, 1864, pp. 509, 560. (*M. nepalensis.*)
1865. *Galerella* Gray, Proc. Zool. Soc. London, 1864, pp. 509, 564. February (*M. ochraceus.*)
1914. *Calogale* Matschie, Sitz.-ber. Ges. nat. Freunde Berlin, 1914, p. 438.

This genus, together with the succeeding genera of Viverridæ, are considered by Pocock to belong to a separate family which he calls the Mungotidæ.[1] Matschie (1914) considers the members of the "*gracilis*" group as forming a distinct genus, *Calogale*.

For measurements of specimens of mungooses see pages 128-129.

MUNGOS DENTIFER Heller.

Plate 32, figs. 1, 2, 3.

1913. *Mungos dentifer* Heller, Smithsonian Misc. Coll., vol. 61, No. 13, p. 10, September 16. (Maji-ya-chumvi, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Two, as follows:

British East Africa: Maji-ya-chumvi, 2 (Heller).

This small mungoose of the *ochraceus-melanurus* group agrees with the Zanzibar Island species, *Mungos lasti*, in possessing small first lower premolars, a character which distinguishes these two forms from all their relatives so far as known.

MUNGOS SANGUINEUS PARVIPES Hollister.

Plate 32, figs. 4, 5, 6.

1916. *Mungos sanguineus parvipes* Hollister, Smithsonian Misc. Coll., vol. 66, No. 1, p. 5. February 10. (Kaimosi, Kavirondo, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Two, from the following localities:

British East Africa: Kaimosi, 1 (Heller); Lukosa River, 1 (Heller).

This form is readily distinguished from its geographical neighbors by its small skull and short hind foot. The type-specimen from

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 17, p. 415, June, 1916; Proc. Zool. Soc. London, 1916, p. 349, June, 1916.

Kaimosi is in the black phase and the specimen from Lukosa River is colored much like the grizzled *Mungos sanguineus ibeæ*.

For measurements see page 128.

MUNGOS SANGUINEUS IBEÆ Wroughton.

1892. *Herpestes gracilis* True, Proc. U. S. Nat. Mus., vol. 15, p. 451. (Not of Rüppell.)

1907. *Mungos sanguineus ibeæ* Wroughton, Ann. and Mag. Nat. Hist., ser. 7, vol. 20, p. 118. August. (Fort Hall, British East Africa; type in British Museum.)

1910. *Mungos sanguienus ibeæ* Roosevelt, African Game Trails, Amer. ed. p. 473; London ed., p. 485. (Part.)

Specimens.—Nine, from the following localities:

British East Africa: Mtoto Andei, 1 (Heller); Plains east of Kilimanjaro, 1 (Abbott); Sir Alfred Pease's Farm, Kitanga, 2 (Mearns); Southern Guaso Nyiro River, 2 (Mearns, Loring); Ulukenia Hills, 2 (Loring); Voi, 1 (Heller).

A female collected by Mearns at Kitanga, May 8, was not pregnant; there were two pairs of mammæ. Abbott notes of the female taken east of Kilimanjaro in June that the mammæ contained milk.

The nine skins of this form are quite uniform in color, with the exception of one of the specimens from the Southern Guaso Nyiro River. This latter skin is much more yellowish, or pale ochraceous, than the average, and is particularly bright on the back, legs, and tail. The second specimen from the same locality is in all respects normal. There is very little tendency toward melanism; only a single skin, from Sir Alfred Pease's Farm, shows a definite blackish area along the back, and this is rather indistinct.

The mungoose described by Matschie as *Calogale maræ*[1] must be very close indeed to *ibeæ;* the type-locality, Ngare Mdusse (a southern tributary of the Mara River), is near the German East African boundary only a short distance south of our Guaso Nyiro locality. The *Calogale elegans*, of the same author,[2] from Fort Smith, near Nairobi, would seem to be the same form, also.

MUNGOS SANGUINEUS ORESTES Heller.

Plate 33.

1911. *Mungos sanguineus orestes* Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 15. February 28. (West slope of Mount Kenia, altitude 8,500 feet; type in U. S. Nat. Mus.)

Specimens.—Seven, as follows:

British East Africa: West slope of Mount Kenia (Mearns, Loring).

Mearns records the color of the iris in this species as "yellow-brown." The Kenia race of *Mungos sanguineus* is a dark-colored subspecies. Of the seven skins at hand five are quite blackish, and the remaining two are darker brown, less grayish, than any skin of *M. s. ibeæ* in the collection. The size and characters of the skull are as in *ibeæ*.

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[1] Sitz.-ber. Ges. nat. Freunde Berlin, p. 453. December, 1914.

[2] Idem, p. 456.

MUNGOS SANGUINEUS RENDILIS Lönnberg.

1912. *Mungos sanguineus rendilis* LÖNNBERG, Kungl. Sv. Vet. Akad. Handl., vol. 48, No. 5, p. 66. (Northern bank of Northern Guaso Nyiro River, below Chanler Falls, British East Africa; type in R. Nat. Hist. Mus., Stockholm.)

Specimens.—Four, from localities as follows:

BRITISH EAST AFRICA: Longaya Water, Marsabit Road, 1 (Heller); Merelle Water, Marsabit Road, 1 (Heller); Mount Gargues, 1 (Heller); Mount Lololokwi, 1 (Heller).

The stomach of the Mount Gargues specimen contained a green snake and a small bird.

The four skins from north of Mount Kenia are decidedly more pale buffy, less grayish, than the series from south of Kenia, representing true *ibeæ;* they are also much more finely vermiculated. The female skull of this form is proportionally much less in size, compared with male skulls, than in the related races of this mungoose.

For measurements of specimens see page 129.

MUNGOS ICHNEUMON FUNESTUS Osgood.

1892. *Herpestes caffer* TRUE, Proc. U. S. Nat. Mus., vol. 15, p. 452. (Not of Gmelin; specimen from Kilimanjaro.)

1910. *Mungos ichneumon funestus* OSGOOD, Field Mus., Zool. Ser., vol. 10, No. 3, p. 17. April. (Naivasha, British East Africa; type in Field Mus. Nat. Hist., Chicago.)

Specimens.—Three, from localities as follows:

BRITISH EAST AFRICA: Kaimosi, 1 (Heller); Nairobi, 1 (Heller).

GERMAN EAST AFRICA: Mount Kilimanjaro, 1 (Abbott).

Genus ATILAX Geoffroy and Cuvier.

1826. *Atilax* GEOFFROY and CUVIER, Hist. Nat. Mamm., vol. 5, livr. 54, p. [2]. (*A. paludinosus.*)

The water mungooses recently have been given formal generic distinction by Pocock in his paper On the External Characters of the Mongooses.[1]

For measurements of specimens see page 129.

ATILAX PALUDINOSUS ROBUSTUS (Gray).

1865. *Athylax robustus* GRAY, Proc. Zool. Soc. London, 1864, p. 558. (White Nile; type in British Museum.)

Specimen.—One, as follows:

BRITISH EAST AFRICA: Guas Ngishu Plateau (White).

This specimen of the water mungoose is clearly of a form distinct from the subspecies found in the Taita Hills and Kilimanjaro regions.

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[1] Proc. Zool. Soc. London, p. 349. June, 1916.

On account of its large size, and in the absence of typical specimens of *robustus* from the White Nile, it is referred to that early described form. Although a younger animal than any of our specimens of *A. p. rubescens*, it has a larger skull, which is especially characterized by its general elongation and greatly inflated auditory bullæ.

The following notes were made on the type-specimen of *Atilax paludinosus robustus*, by Heller:

Type from "White Nile," no definite locality. Very old, skull with sutures all obliterated and teeth worn down flat. Skin much lighter colored than any other specimen in the collection. Measurements of type skull (condyles cut away; bullæ broken): Back of bullæ to incisors, 108; zygomatic width, 62.5; postorbital constriction. 17; width palate across pm^4, 37; condylo-incisive length of mandible, 83; upper tooth row to front of canine, 42.5; width of m^2, 6.3; width of m^1, 10.7; width of m_2, 4.5; length of m_2, 6.

ATILAX PALUDINOSUS RUBESCENS (Hollister).

Plate 34.

1892. *Herpestes galera* (Erxl.); var. *robustus* TRUE, Proc. U. S. Nat. Mus., vol. 15, p. 452. (Specimens from Kilimanjaro; not of Gray.)

1912. *Mungos paludinosus rubescens* HOLLISTER, Proc. Biol. Soc. Washington, vol. 25, p. 1. January 23. (Mt. Kilimanjaro at 4,000 feet, German East Africa; type in U. S. Nat. Mus.)

Specimens.—Four, from localities as follows:

BRITISH EAST AFRICA: Mount Mbololo, 1 (Heller); Voi, 1 (Heller.)

GERMAN EAST AFRICA: Mount Kilimanjaro, 2 (Abbott).

The specimen from Mount Mbololo, an adult female with nasal and basal sutures closed, agrees in all respects with the Kilimanjaro specimens and unquestionably represents the same form. The example from Voi, also an old adult female, differs from the type of *rubescens* in its much larger auditory bullæ and much more reddish coloration. It is considerably larger than the female skull from Mount Mbololo. The general shape of skull agrees better with *rubescens*, however, than with the Guas Ngishu skull I have referred to *robustus*, and although the specimen may represent a new race it seems unwise to name more forms of this species until suitable series of skulls have been assembled for study of individual and geographic variation, Color of skins is doubtless of little value in differentiating subspecies of this mungoose, and the shape and size of the auditory bullæ are unreliable characters to use in describing new forms unless good series of skulls prove their constancy.

Genus ICHNEUMIA Geoffroy.

1837. *Ichneumia* GEOFFROY, Ann. Sci. Nat., Paris., ser. 2, vol. 8, p. 251. (*I. albicauda.*)

Mr. Pocock has described[1] the external characters of the white-tailed mungoose and these, in addition to notable cranial and dental

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[1] Proc. Zool. Soc. London, pp. 349–374. June, 1916.

Measurements of specimens of Mungos, Atilax, and Ichneumia.

Form and locality.	No.	Sex.	Head and body.	Tail vertebrae.	Hind foot.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Postorbital constriction.	Breadth of rostrum over canines.	Mandible.	Maxillary tooth row.	Mandibular tooth row, without incisors.	Observations.
M. dentifer.														
B. E. A.: Maji-ya-chumvi	182731	Male	225	215	49	....	....	21.2	....	10.8	34.0	21.2	22.3	Milk canines.
Do	[1] 182732	Female	270	205	45	54.3	27.9	21.3	9.9	9.7	33.9	20.2	21.8	Sutures all closed.
M. s. parvipes.														
Kaimosi	[1] 182739	Male	306	247	54	61.3	30.9	23.2	9.6	10.9	39.3	21.7	24.2	Sutures all closed.
Lukosa River	182740	...do	310	272	54	61.7	31.2	22.7	10.0	10.4	38.7	21.7	23.6	Do.
M. s. ibex.														
South Guaso Nyiro	162128	Female	351	308	64	64.2	32.9	24.4	9.9	11.6	40.5	22.7	26.5	Sutures all closed.
Do	162129	...do	330	320	65	....	31.6	24.5	11.8	11.4	40.6	22.7	24.5	Basal suture open.
Kitanga	161906	Male	350	325	67	65.1	32.8	24.3	10.9	11.9	42.2	23.9	26.5	Basal suture closed.
Do	161907	Female	350	295	65	66.5	30.8	22.7	8.7	11.3	41.5	24.4	26.7	Sutures all closed.
Ulukenia Hills	164158	...do	324	326	65	66.8	31.7	23.5	8.6	10.9	42.6	24.4	26.4	Do.
Mtoto Andei	181535	Male	330	303	58	63.7	33.8	24.2	10.8	12.1	40.2	22.9	25.2	Do.
Voi	182736	...do	320	306	60	65.1	32.5	23.2	12.0	12.0	40.3	23.7	26.4	Basal suture open.
East of Kilimanjaro	18936	Female	....	....	....	64.8	31.9	23.3	9.0	11.0	41.3	24.0	26.2	Sutures all closed.
M. s. orestes.														
Mount Kenia	[1] 164152	Male	300	282	65	64.9	34.3	24.2	10.8	12.4	41.5	24.6	27.3	Sutures all closed.
Do	164153	...do	355	285	71	66.2	35.1	24.1	11.3	12.7	42.9	24.3	27.2	Do.
Do	164156	...do	347	304	69	67.3	33.8	23.6	10.5	12.8	43.5	24.6	27.0	Do.
Do	164151	Female	333	300	64	64.3	30.3	23.6	11.3	11.2	39.8	23.4	25.7	Nasal sutures open.
Do	164154	...do	336	277	62	63.5	31.9	22.9	9.2	11.4	38.3	....	24.8	Sutures all closed.
Do	164155	...do	340	290	62	61.8	30.8	23.2	10.2	11.1	38.3	22.6	24.4	Nasal sutures open.
Do	164157	...do	312	298	63	62.6	30.9	23.3	10.3	11.3	38.8	22.5	24.8	Basal suture closed.

M. s. rendilis.														
Mount Gargues	182735	Male	315	285	57	63.7	33.3	24.4	11.0	11.4	39.5	22.7	25.2	Basal suture closed.
Mount Lololokwi	184797	...do	....	....	....	64.5	32.0	23.4	11.6	11.7	39.7	23.4	26.1	Sutures all closed.
Merelle Water	182734	...do	330	315	60	66.1	34.7	24.6	11.0	12.6	42.4	24.4	26.4	Do.
Longaya Water	182733	Female	285	280	55	59.6	29.6	22.3	9.1	10.9	37.4	21.8	24.0	Do.
A. p. robustus.														
Guas Ngishu Plateau	173005	Male	....	....	....	109	....	42.2	15.4	23.5	74.7	39.4	45.1	Nasal sutures open.
A. p. rubescens.														
Mount Mbololo	182238	Female	450	265	62	99	59	39.3	16.2	23.0	71.7	36.8	42.6	Sutures all closed.
Voi	182227	...do	500	360	100	107	63	42.4	13.6	25.4	74.1	40.2	46.3	Do.
G. E. A.: Mt. Kilimanjaro	[1] 35251	Male	....	....	....	102	56	39.0	15.3	24.8	72.3	37.8	44.2	Nasal sutures open.
I. a. ibeana.														
B. E. A.:														
Kisumu	182346	Female	550	....	120	110	56	37.5	23.3	21.2	77.4	43.0	47.8	Sutures all closed.
Naivasha	162130	Male	575	455	133	106	53	38.0	21.9	21.2	74.4	40.6	45.8	Basal and nasal sutures open.
Do	162133	Female	567	495	128	....	55	....	23.6	21.5	78.8	43.8	48.0	Teeth considerably worn.
Nairobi	182728	Male	....	....	....	....	53	....	24.0	20.5	....	41.5	....	Nasal sutures open.
Athi Plains	182729	Female	....	....	....	102	....	37.4	24.8	20.4	70.3	40.2	45.2	Basal and nasal sutures open.
Ulukenia Hills	164572	....	....	....	....	109	55	37.6	21.8	22.2	76.2	42.3	47.8	Basal suture closed.
Kapiti Plains	162134	....	....	....	....	98	48	36.8	23.0	20.2	69.1	....	....	Basal and nasal sutures open.
Mtoto Andei	181536	Female	450	550	115	105	54	37.4	21.4	21.9	74.3	40.8	45.4	Sutures all closed.
Voi	182225	...do	530	....	110	105	53	35.4	20.0	20.5	73.7	42.8	47.4	Do.
Do	182257	...do	470	395	115	100	50	36.0	22.6	20.7	70.0	39.7	44.8	Basal and nasal sutures open.
Maji-ya-chumvi	182263	...do	525	435	118	99	50	36.3	20.1	19.8	69.2	39.2	42.5	Sutures all closed.
Melinda	182730	...do	525	435	106	101	50	36.5	22.2	20.3	70.0	39.5	40.0	Basal and nasal sutures open.
Changamwe	[2] 163294	...do	560	440	125	110	52	38.2	22.2	22.2	78.7	44.6	48.2	Basal suture closed; teeth much worn.
I. a. dialeucos.														
Mount Lololokwi	[1] 184794	Male	....	....	....	104	54	37.1	20.2	20.3	69.5	39.8	44.8	Sutures all closed.
Do	184796	...do	....	....	....	104	53	37.3	21.2	20.8	73.4	40.8	45.8	Basal suture closed.

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[1] Type.

[2] Type of "*Mungos albicaudus ferox.*"

differences long known, seem of sufficient importance to warrant recognition of a special genus for the animals.

For measurements of specimens see page 129.

ICHNEUMIA ALBICAUDA IBEANA (Thomas).

Plate 35.

1904. *H[erpestes] a[lbicaudus] ibeanus* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 13, p. 409. June. (Athi-ya-Maui,[1] Mombasa-Uganda Railway, British East Africa; type in British Museum.)

1910. *Mungos albicaudus ibeanus* Roosevelt, African Game Trails, Amer. ed., p. 473; London ed., p. 485.

1913. *Mungos albicaudus ferox* Heller, Smithsonian Misc. Coll., vol. 61, No. 13, p. 11. September 16. (Changamwe, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Eighteen, from localities as follows:

British East Africa: Athi Plains, 1 (Klein); Changamwe, 1 (Mearns); Kapiti Plains, 1 skull only (Loring); Kisumu, 1 (Heller); Lukosa River, 1 (Heller); Maji-ya-chumvi, 1 (Heller); Mazeras, 1 (Heller); Melindi, 1 (Hinde); Mtoto Andei, 1 (Heller); Nairobi, 1 (Klein); Naivasha, 3 (Mearns, Loring, Heller); Ulukenia Hills, 2 (Loring); Voi, 3 (Heller).

Heller has recorded the stomach contents of specimens collected by himself as follows: Lukosa River, small cobra and large beetles; Kisumu, large beetles; Voi, one with large beetles, one with termites, and one termites and rodents. Mearns records the weight of an adult male [basal and nasal sutures still open] from Naivasha as ten pounds, and the color of the irides of the Changamwe specimen as "light hazel."

The excellent series listed above shows the marked uniformity of color, except for cases of melanism, which obtains in this form throughout its range in British East Africa. Eliminating specimens with black tails the remaining skins, from Kavirondo to the coast, are very evenly colored, and are easily distinguished from the silvery form found in the region above the Northern Guaso Nyiro. The type-specimen of Heller's *Mungos albicaudus ferox* from Changamwe, near the coast, is in such a ragged state of pelage that any comparison with skins from other localities is valueless. A skin in much better condition from Mazeras is, however, colored quite as are skins from near the type-locality of *ibeana*, and I can find no other characters by which to recognize the coast form. The skull of the type of *ferox* is somewhat smaller than some female skulls of *ibeana*, and the teeth are so much worn that no intelligent comparisons are possible, so that the characters of "larger size" and larger lower molar can hardly be accepted without more material from the Mombasa region. The skin from Melinda, on the coast north of Mombasa, is the darkest in the series, but is evidently melanistic.

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[1] Mr. Heller thinks this is no doubt the Swahili name for Stony Athi station, as *maui* in Swahili="stony."

The following very interesting account of a white-tailed mungoose and a snake was told to Colonel Roosevelt by Mr. Leslie Tarlton in Africa:

> The mongoose was an inmate of the house where he [Tarlton] dwelt with his brother and was quite tame. One day they brought in a rather small puff adder, less than two feet long, put it on the floor, and showed it to the mongoose. Instantly the latter sprang toward the snake, every hair in its body and tail on end, and halted five feet away, while the snake lay in curves like the thong of a whip, its head turned toward the mongoose. Both were motionless for a moment. Then suddenly the mongoose seemed to lose all its excitement; its hair smoothed down; and it trotted quietly up to the snake, seized it by the middle of the back—it always devoured its food with savage voracity—and settled comfortably down to its meal. Like lightning the snake's head whipped round. It drove its fangs deep into the snout or lip of the mongoose, hung on for a moment, and then repeated the blow. The mongoose paid not the least attention, but went on munching the snake's body, severed its backbone at once, and then ate it all up, head, fangs, poison, and everything; and it never showed a sign of having received any damage in the encounter.[1]

ICHNEUMIA ALBICAUDA DIALEUCOS (Hollister).

Plate 36, figs. 5, 6.

1916. *Mungos albicaudus dialeucos* Hollister, Smithsonian Misc. Coll., vol. 66, No. 1, p. 6. February 10. (Mount Lololokwi, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Four, from the following localities:

British East Africa: Merelle Water, Marsabit Road, 1 (Heller); Mount Lololokwi, 3 (Heller).

This color subspecies is related to *Ichneumia albicauda ibeana* rather than to the more northern *I. a. leucura.* It has the larger teeth of the common British East African form, and is distinguished only by its more silvery, less buffy, coloration. The four skins in the collection are very much alike and show no conspicuous variation in color; all have clear white tails.

Genus HELOGALE Gray.

1862. *Helogale* Gray, Proc. Zool. Soc. London, 1861, p. 308. April. (*H. parvula.*)

Several subspecies of the lesser mungoose occur in eastern Equatorial Africa. The four forms represented in our collection can be referred to two distinct species, which in the present unrevised condition of the genus may be called *undulata* Peters and *hirtula* Thomas. A careful revision of the forms of the genus, based upon all the available material in different museums, is greatly needed. There is evidently an unusual amount of geographic variation in these animals.

For measurements of specimens of *Helogale* see table, page 133.

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[1] African Game Trails, pp. 290, 291. 1910.

HELOGALE UNDULATA AFFINIS Hollister.

Plate 36, figs. 1, 2, 3, 4.

1916. *Helogale undulata affinis* HOLLISTER, Smithsonian Misc. Coll., vol. 66, No. 1, p. 7. February 10. (Mount Lololokwi, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Six, as follows:

BRITISH EAST AFRICA: Mount Lololokwi, summit at 6,000 feet. 2 (Heller); Rumathe Water, Northern Guaso Nyiro, 4 (Heller).

The specimens from Northern Guaso Nyiro have slightly darker tails and more heavily speckled feet than the type and topotype skins from the summit of Mount Lololokwi. According to Heller's field notes these animals go in troups of a dozen or more and make a peculiar rustling noise as they move through the leaves and brush. They also keep up a chirping to each other. He shot an old male which was chirping loudly at him from a rock. At Rumathe Water he saw several troups which took refuge when frightened in the funnels of termite hills. The four taken at this place were shot by waiting at the termite hills until they appeared after their fright.

HELOGALE UNDULATA RUFULA Thomas.

1892. *Helogale undulata* TRUE, Proc. U. S. Nat. Mus., vol. 15, p. 451. (Specimens from Kilimanjaro region; not of Peters.)

1910. *Helogale undulata rufula* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 194. February. (Rogoro, Kikuyu, British East Africa; type in British Museum.)

Specimens.—Three, from localities as follows:

BRITISH EAST AFRICA: Kijabe, 1 (Heller); Plains east of Kilimanjaro, 1 (Abbott); Taveta, 1 (Abbott).

The Kilimanjaro specimens collected by Doctor Abbott agree in most details with the Kijabe specimen, which must be assumed to represent typical *rufula*. They are, however, slightly brighter colored and the skulls are relatively a little broader. They are decidedly different in coloration from the Mazeras specimens which I have for the present referred to *Helogale undulata atkinsoni* Thomas, and in all points of difference agree better with the Kijabe specimen of *rufula* referred to above.

HELOGALE UNDULATA ATKINSONI Thomas.

1897. *Helogale atkinsoni* THOMAS, Ann. and Mag. Nat. Hist., ser. 6, vol. 20, p. 378. (Hargaisa, Somaliland; type in British Museum.)

Specimens.—Three, as follows:

BRITISH EAST AFRICA: Mazeras (Heller).

It is with considerable doubt that I refer these three skins to *Helogale undulata atkinsoni*. They differ in many respects from specimens of other British East African races of *undulata* (*rufula* and *affinis*) and have the decidedly shorter tail of true *atkinsoni*. They probably represent an undescribed subspecies, nearer to *atkinsoni*

Measurements of specimens of Helogale from British East Africa.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Postorbital constriction.	Breadth of rostrum over canine.	Mandible.	Maxillary tooth row.	Mandibular row, without incisors.	Observations.
H. u. affinis.														
Mount Lololokwi	[1] 182715	Male	220	175	46	49.7	29.6	22.8	9.2	9.5	33.8	16.5	....	Basal and nasal sutures closed.
N. Guaso Nyiro	182717	...do	225	184	45	....	29.1	....	10.0	11.3	33.1	16.7	19.6	Nasal sutures open.
Do	182719	...do	205	170	46	48.0	....	....	10.7	9.5	....	16.0	18.8	Basal and nasal sutures open.
Do	182720	...do	225	180	45	50.7	28.7	23.3	8.8	10.5	33.3	16.7	19.3	Basal sutures closed.
Do	182718	Female	10	173	42	48.0	28.9	22.4	9.4	10.5	33.4	16.5	19.6	Basal and nasal sutures closed.
H. u. rufula.														
Kijabe	181781	Male	240	175	48	52.2	30.7	23.8	8.6	10.9	35.1	17.3	20.2	Basal suture closed.
Taveta	35095	Female	....	....	....	46.4	30.6	22.8	10.2	10.2	32.1	16.6	18.7	Basal and nasal sutures closed.
E. of Kilimanjaro	35094	...do	....	....	....	45.7	25.7	20.5	11.2	9.2	30.0	16.4	19.2	Sutures all open.
H. u. atkinsoni.														
Maseras	182721	Female	215	150	45	47.7	27.1	22.3	11.0	11.0	31.0	17.0	19.9	Sutures all open.
Do	182722	...do	240	157	44	48.8	28.7	22.9	11.2	11.0	32.4	17.1	19.7	Do.
Do	182723	...do	245	145	46	50.8	29.9	23.1	9.8	11.2	33.7	17.6	20.3	Basal suture closed.
H. s. ahlselli.														
Merelle Water	182713	Male	240	211	48	52.0	31.0	24.4	10.8	11.3	31.5	18.2	20.7	Basal and nasal sutures closed.
Do	182712	Female	235	194	49	50.2	31.2	23.9	10.2	11.0	34.3	18.5	20.6	Do.
Koya Water	182714	Male	260	205	50	49.6	29.2	22.2	10.3	10.4	33.9	17.0	19.8	Nasal sutures open.

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[1] Type.

than to *rufula*, but until the forms of the group are better known it is certainly better to consider them as *atkinsoni* than to name another closely related subspecies on such limited material. The three specimens were compared by Heller in London and he has made the following note:

> Mazeras specimens almost identical to type [of *atkinsoni*], perhaps a shade more rufous; also very close in color to *rufula*, but slightly lighter and with decidedly shorter tails. Skull with slightly larger teeth than *atkinsoni*.

The following notes made by Heller in Berlin on the type-specimen of *Helogale undulata* (Peters) are also of great interest in this connection:

> *Helogale undulata* (Peters). Type 1127, Mossambique (W. Peters). Skin mounted; skull perfect, adult. Color: Light buffy-tipped hairs, ground color mummy brown, not reddish like British East African specimens. Skull: Condyloincisive length, 48; zygomatic breadth, 28; interorbital breadth, 10; postorbital breadth, 10; tooth row, including canine, 16.2; length of mandible, 32. Nasal sutures closed.

HELOGALE HIRTULA AHLSELLI Lönnberg.

1912. *Helogale hirtula ahlselli* LÖNNBERG, Ann. and Mag. Nat. Hist., ser. 8, vol. 9, p. 64. January. (Thornbush country on the northern side of Northern Guaso Nyiro River, British East Africa; type in R. Nat. Hist. Museum, Stockholm.)

Specimens.—Five, as follows:

BRITISH EAST AFRICA: Kara River, Marsabit Road, 1 (Heller); Koya Water, Marsabit Road, 1 (Heller); Lakiundu River, Northern Guaso Nyiro, 1 (Heller); Merelle River, Marsabit Road, 2 (Heller).

This form must be very close indeed to *Helogale hirtula lutescens* Thomas[1] from the northern end of Lake Rudolf; no specimens of typical *lutescens* are available for comparison, but *ahlselli* is evidently a somewhat brighter colored subspecies, with more ochraceous colored lower back and rump.

Like the members of the *undulata* group, these animals go in packs. Heller saw one pack of six near the Lakiundu River which escaped in *Tatera* holes. Again this same pack took refuge in a termite nest. Heller's notes say: "They move about in small packs like the *Crossarchus* and have no permanent burrows."

Genus BDEOGALE Peters.

1852. *Bdeogale* PETERS, Mon.-ber. K. Preuss. Akad. Wiss., Berlin, p. 81. (*B. crassicauda*.)

1894. *Galeriscus* THOMAS, Ann. and Mag. Nat. Hist., ser. 6, vol. 13, p. 522. June. (*B. jacksoni*.)

Specimens of this genus are rather rare in collections. The animals are evidently not common in British East Africa, as no specimens were secured by the Smithsonian African Expedition. The two species sent in from the Rainey Expedition are widely different in color and represent two distinct groups.

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 8, p. 725, December, 1911.

BDEOGALE JACKSONI (Thomas).

1894. *Galeriscus jacksoni* THOMAS, Ann. and Mag. Nat. Hist., ser. 6, vol. 13, p. 523. June. (Mianzini, British East Africa; type in British Museum.)

Specimens.—Two, as follows:

BRITISH EAST AFRICA: Lukosa River (Heller).

These specimens are skins, without skulls, and were purchased from Nandi natives. The form will most surely prove to be a geographic subspecies of *Bdeogale nigripes* Pucheran, of West Africa. Matschie, as early as 1895,[1] called attention to the fact that "*Galeriscus*" *jacksoni* is in reality a *Bdeogale.* This was overlooked by Pocock in his note on *Galeriscus*, 1916.[2]

BDEOGALE CRASSICAUDA OMNIVORA Heller.

Plate 34.

1913. *Bdeogale crassicauda omnivora* HELLER, Smithsonian Misc. Coll., vol. 61, No. 13, p. 12. September 16. (Mazeras, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Four, including one large fetus, as follows:

BRITISH EAST AFRICA: Mazeras (Heller).

The stomach of the type-specimen, collected December 21, contained beetles and mice. There was a large embryo which is preserved in alcohol. A second female taken the same week was nursing a quarter-grown young one, which also is in the collection. In the original description of this race the feet are described as black; they are in reality dark brown, and are far from black in color.

The type and adult topotype, both females, with basal and nasal sutures of the skull entirely closed, measure as follows: Head and body, 420, 400; tail vertebræ, 245, 250; hind foot, 81, 80; ear, 34, 37. Skulls: Condylobasal length, 84.6, 84.5; zygomatic breadth, 45.4, 44.6; mastoid breadth, 32.9, 31.9; postorbital constriction, 14.2, 13.4; interorbital breadth, 17.8, 17.6; lachrymal foramen to alveolar point, 30.3, 29.8; breadth of rostrum over canine, 19.4, 19.2; length of mandible, 58.5, 57.4; maxillary tooth row, including canine, 30.9, 31.0; mandibular row, including canine, 35.3, 34.2.

No specimens of the related forms are in the collection. The following manuscript notes on the type-specimens of *Bdeogale crassicauda* Peters and *Bdeogale puisa* Peters were made by Heller at the Berlin Museum, and are published here for preservation:

> *Bdeogale crassicauda* Peters. Type 1151, old adult ♀, molars worn and sutures ankylosed; skin mounted and faded. Tette (coll. W. Peters). Upperparts annulated black and grayish-white, much like *Mungos albicaudus*; tail dark seal-brown, underfur grayish-buff or whitish; feet seal brown. Skull: Condyloincisive length, 85; zygomatic breadth, 45; interorbital breadth, 17.5; postorbital breadth, 15; upper tooth row with canine, 30.5; width of m^2, 7.1; length of mandible, 60.

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[1] Die Säugethiere Deutsch-Ost-Afrikas, p. 147. 1895.

[2] Ann. and Mag. Nat. Hist., ser. 8, vol. 17, p. 179. February, 1916.

Bdeogale puisa Peters. Type, 1150, ♂, Querimba; Peters coll., skin mounted, faded. Skull with top of braincase sawed off and lost. Very old, teeth worn away to alveoli and last upper molars gone; points of canines much worn. Color: Body above annulated buffy and umber-brown; tail black, hair brown at base; legs seal-brown. Skull: Condyloincisive length, 93; zygomatic breadth, 54; interorbital breadth, 21; postorbital breadth, 15.5; length of mandible, 66; upper tooth row with canine, 31; width of m^2, 8.

Genus CROSSARCHUS Geoffroy and Cuvier.

1825. *Crossarchus* Geoffroy and Cuvier, Hist. Nat. Mamm., vol. 5, livr. 47, text "le Mangue," p. 3. February. (*C. obscurus.*)
1865. *Ariela* Gray, Proc. Zool. Soc. London, 1864, pp. 509, 565. February. (*C. fasciatus.*)

The banded mungoose is represented in our East African collections by one form only. A much darker, richer colored race, more like the South African forms, is found in Uganda; and other species occur in Abyssinia, Somali, and Sudan. Mr. Pocock has recently recognized the genus *Ariela* as distinct from *Crossarchus*.[1]

CROSSARCHUS FASCIATUS COLONUS Heller.

Plate 37, figs. 1, 2; plate 38, figs. 1, 2.

1892. *Crossarchus mungo* True, Proc. U. S. Nat. Mus., vol. 15, p. 453. (Specimen from Taveta; not of Gmelin.)
1910. *Crossarchus fasciatus macrurus* Roosevelt, African Game Trails, Amer. ed., p. 473; London ed., p. 485. (Not of Thomas.)
1911. *Crossarchus fasciatus colonus* Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 16. February 28. (Southern Guaso Nyiro River, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Twelve, from localities as follows:

British East Africa: Kabalolot Hill, Sotik, 4 (Heller); Loita Plains, 2 (Heller); Southern Guaso Nyiro River, 5 (Heller, Mearns, Loring); Taveta, 1 (Abbott).

The specimen from Taveta is in all essential details like the specimens from the Southern Guaso Nyiro and Sotik. There is considerable variation among the skins from the type region, some showing much more reddish-brown in the lower back than others.

These mungooses are often met with on the grassy plains of the Sotik country, where they live in colonies in burrows on the open veldt. They do not stop long in any locality, but move about in small packs of ten to twenty individuals, which take up a temporary abode in any nest of burrows which they find convenient. From our observations it was apparent that they do not remain more than a day or two in any one set of burrows.[2]

Doctor Mearns records the color of the iris of an adult female as "yellowish-brown."

For measurements see page 137.

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[1] Pocock, Proc. Zool. Soc. London, 1916, p. 349. June, 1916.

[2] Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 16. February 28, 1911.

Measurements of specimens of Crossarchus fasciatus colonus.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Postorbital constriction.	Breadth of rostrum over canines.	Mandible.	Maxillary tooth row.	Mandibular row, without incisors.	Observations.
So. Guaso Nyiro	181537	Male	400	295	82	77	40.2	....	13.7	15.3	51.6	27.3	30.3	Basal and nasal sutures open.
Do.	181538	...do	400	275	83	78	41.7	31.3	14.0	15.1	52.8	27.5	32.0	Do.
Do.	162131	Female	350	300	91	....	39.1	....	14.2	14.2	50.6	25.8	29.8	Do.
Do.	[1] 162132	...do	380	260	92	76	42.5	32.2	13.2	15.4	52.8	27.4	30.2	Basal and nasal sutures closed.
Kabalolot Hill, Sotik	181541	Male	390	260	83	76	40.5	31.6	12.7	15.5	52.0	26.6	30.8	Basal and nasal sutures open.
Do.	181542	...do	380	257	83	75	39.8	31.4	14.1	15.2	51.3	26.8	30.2	Do.
Do.	181543	...do	365	260	80	74	37.4	29.9	12.8	14.1	49.9	25.5	29.6	Do.
Do.	181544	Female	390	260	80	76	42.3	31.4	12.3	15.9	53.5	27.8	31.4	Basal and nasal sutures closed.
Loita Plains	181539	Male	415	295	83	78	42.4	32.9	11.2	16.5	54.8	28.5	32.2	Do.
Do.	181540	Female	380	255	79	75	42.4	31.6	14.1	15.2	52.2	26.7	31.0	Do.
Taveta	34685	...do	....	....	....	75	40.1	31.5	12.7	15.3	50.4	26.8	30.2	Do.

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[1] Type.

Family PROTELIDÆ.

Genus PROTELES Geoffroy.

1824. *Proteles* GEOFFROY, Mem. Mus. Hist. Nat., Paris, vol. 11, p. 355. (*P. cristatus.*)

In addition to the subspecies of the aard-wolf listed below, others have been described from Somaliland (*Proteles cristatus septentrionalis* Rothschild)[1] and from Nubia (*P. c. pallidior* Cabrera).[2]

PROTELES CRISTATUS TERMES Heller.

Plate 37, fig. 3; plate 38, fig. 3.

1910. *Proteles cristatus septentrionalis* ROOSEVELT, African Game Trails, Amer. ed., p. 473; London ed., p. 485. (Not of Rothschild.)

1913. *Proteles cristatus termes* HELLER, Smithsonian Misc. Coll., vol. 61, No. 13, p. 9. September 16. (Kabalolot Hill, headwaters of the Amala River, west of the Loita Plains, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Four, from the following localities:

BRITISH EAST AFRICA: Kabalolot Hill, Sotik, 1 (Heller); Northern Guaso Nyiro River, near Neuman's Boma, 1 (K. Roosevelt); Telek River, Sotik, 1 (Johnston); Ulukenia Hills, 1 (Loring).

Heller records the stomach contents of the type-specimen as a "mass of termites." In the original description of *termes* he refers the specimen from Northern Guaso Nyiro to this race with the remarks that it is "much more fulvous than those from the higher plateau of the Loita" and also notes that "in the lack of grayish coloration and the suppression of the black areas this form approaches the Somaliland race."[3]

For measurements see table.

Measurements of specimens of Proteles cristatus termes from British East Africa.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Post-orbital constriction.	Breadth of rostrum over canine.	Lachrymal foramen to alveolar point.	Greatest length of nasals.	Length of mandible.	Observations.
No. Guaso Nyiro River	164503	Male	....	....	....	140	82	55	35.8	39	54.8	46	98	Basal suture closed.
Telek River	181495	...do	623	260	148	127	72	49	33.5	37	46.7	38	89	Basal suture open.
Ulukenia Hills	164837	Female	682	254	144	135	88	53	34.8	42	49.7	44	97	Basal suture closed.
Kabalolot Hill	[1] 181523	...do	690	310	142	136	74	48	34.2	37	54.4	43	96	Basal suture open.

[1] Type.

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[1] Nov. Zool., vol. 9, p. 443. 1902.

[2] Ann. and Mag. Nat. Hist., ser. 8, vol. 6, p. 464. 1910.

[3] Smithsonian Misc. Coll., vol. 61, No. 13, p. 9. September 16, 1913.

Family HYÆNIDÆ.

Genus HYÆNA Brisson.

1762. *Hyæna* Brisson, Regn. Anim., ed. 2, p. 13. (*H. hyæna.*)
1868. *Euhyæna* Falconer, Pal. Mem., vol. 2, p. 464. (*H. hyæna.*)

The striped hyena is rare in the southern parts of British East Africa, but is much more common north of Mount Kenia, where a good series of specimens was obtained by the Rainey Expedition.

For measurements see tables, pages 141–142.

HYÆNA HYÆNA SCHILLINGSI Matschie.

Plate 2.

1900. *Hyæna* (*Hyæna*) *schillingsi* Matschie, Sitz.-ber. Ges. nat. Freunde Berlin, p. 55. (West Njiri Swamp,[1] Massai Plains, German East Africa; type in Berlin Museum.)
1910. *Hyæna striata schillingsi* Roosevelt, African Game Trails, Amer. ed., p. 473; London ed., p. 485.
1914. *Hyæna hyæna schillingsi* Roosevelt and Heller, Life-Hist. African Game Anim., vol. 1, p. 254.

Specimens.—Two, as follows:

British East Africa: Olarakeri, Sotik (Heller).

Of the above specimens, one is an old female and one a young male. The adult skin has been mounted for the exhibition series (plate 2, upper figure). This species is evidently much more uncommon in the Sotik than is the larger spotted hyena, as these two specimens were the only ones collected by the Smithsonian African Expedition, while good series of the spotted species were obtained.

HYÆNA HYÆNA BERGERI Matschie.

Plate 3.

1910. *Hyæna* (*Hyæna*) *hienomelas bergeri* Matschie, Sitz.-ber. Ges. nat. Freunde Berlin, p. 361. (Elgeyo Escarpment, east of Sirgoi, British East Africa; type in Berlin Museum.)
1912. *Hyæna schillingsi rendilis* Lönnberg, Ann. and Mag. Nat. Hist., ser. 8, vol. 9, p. 64. January. (Thorn-bush country north of Northern Guaso Nyiro, British East Africa; type in R. Nat. Hist. Mus., Stockholm.)
1914. *Hyæna hyæna bergeri* Roosevelt and Heller, Life-Hist. African Game Anim., vol. 1, p. 255.

Specimens.—Eleven, from the following localities:

British East Africa: Archer's Post, Northern Guaso Nyiro, 3 (Heller); Lakiundu River, 4 (Heller); Merelle Water, Marsabit Road, 4 (Heller).

I have seen no specimens of this hyena from the type region, our material all coming from the eastward, near the type locality of Doctor Lönnberg's *rendilis*. Heller gives the range of *bergeri* as the "desert region of British East Africa from the southern slopes of

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[1] Matschie, Sitz.-ber. Ges. nat. Freunde Berlin, 1910, p. 369.

Mount Kenia and the Mau Escarpment northward through the Lake Rudolf basin, southern Abyssinia, and Somaliland."[1] Matschie's type-locality is therefore near the extreme southwestern limits of distribution, and it seems more than probable that Heller is correct in placing Lönnberg's *rendilis* in synonymy. No striped hyenas are known from the Guas Ngishu country, westward from the type locality of *bergeri*.

HYÆNA DUBIA Schinz.

Plate 3.

1825. *Hyæna dubia* Schinz, Das Thierreich von Cuvier, vol. 4, p. 509. (Dongola, Sudan; "Frankfurter Museum.")

1900. *H[yæna] hienomelas* Matschie, Sitz.-ber. Ges. nat. Freunde Berlin, No. 1, p. 53. January. (Teawa, Atbara, Sudan; based on Latreille, "Sonnini's Suites de Buffon," vol. 27, p. 25.)

1914. *Hyæna hienomelas* G. M. Allen, Bull. Mus. Comp. Zoology, vol. 58, No. 7, p. 341. July.

Specimens.—Two, from the following localities:

Eritrea: "Habesch," 1 (Schrader).

British Somali: Berbera, 1 (Swayne).

Through the kindness of the authorities at the Museum of Comparative Zoölogy I have been able to borrow for study in this connection the skin and skull of an adult male striped hyena collected by Dr. John C. Phillips and Dr. Glover M. Allen at Magangani, Blue Nile, Sudan. This specimen was recorded by Allen as *Hyæna hienomelas* Matschie, and can be considered as typical of that race, and the much earlier named *dubia* of Schinz. The specimen agrees in all details with our material from Eritrea and British Somali. The form represented differs markedly from *H. h. bergeri* of northern British East Africa. It is decidedly lighter in color throughout, the brown, dark buff, and pinkish tones of *bergeri* are replaced with very pale buff or whitish, and the brown tips to the long hairs of the tail in *bergeri* are replaced with blackish. The animal thus presents a much lighter and more grayish, less buffy and brown, appearance throughout, with a lighter, more whitish tail. The body and limb stripes, as a consequence of the lighter ground color, appear much more sharply marked than in *bergeri*. The skulls of *dubia* are very much as in *bergeri*, but the second upper premolor is placed almost straight in the slightly curving tooth row, not sharply turned diagonally inward anteriorly as in *bergeri*. This character is diagnostic and easily seen in our eleven skulls of *bergeri* and the two skulls of *dubia*, and thus appears to be a constant difference between the two forms. A line drawn along the inner margin of this tooth in *bergeri*, and continued forward to the incisors, crosses the outer incisor on the opposite side of the skull, or at least the next tooth inward. The same line

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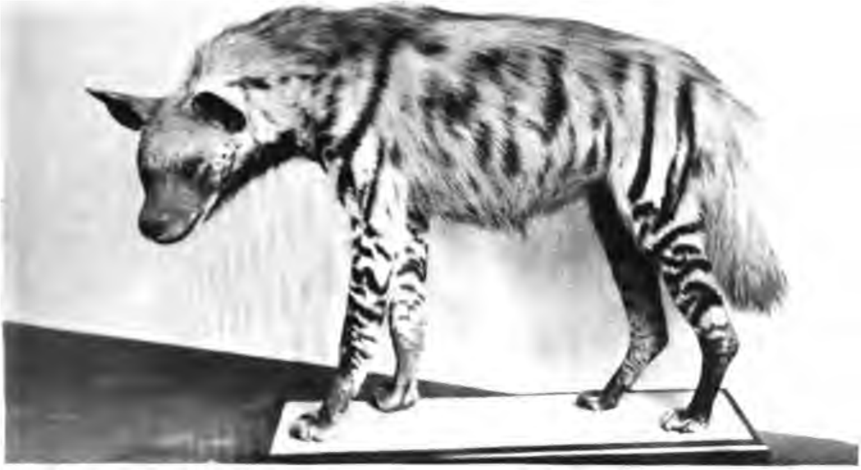
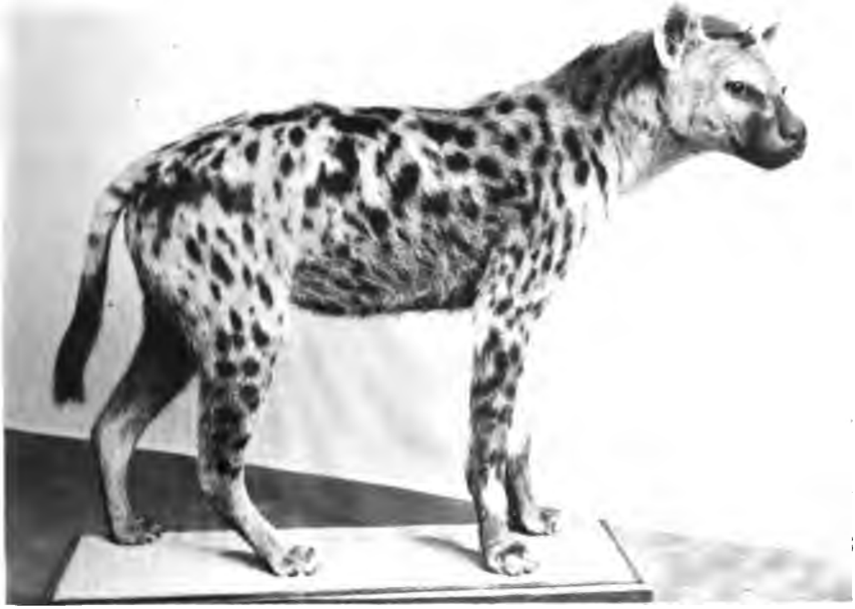
[1] Roosevelt and Heller, Life-Hist. African Game Anim., vol. 1, p. 255. 1914.





UPPER FIGURE, HIGHLAND STRIPED HYENA; LOWER FIGURE, EASTERN SPOTTED HYENA.

FOR EXPLANATION OF PLATE SEE PAGE 181.

Measurements of skulls of Hyæna.

Form and locality.	No.	Sex.	Condylobasal length.	Zygomatic breadth	Mastoid breadth	Postorbital constriction.	Interorbital constriction.	Rostral breadth over canine.	Lachrymal foramen to alveolar point.	Median length nasals.	Mandible.	Maxillary tooth row.	Lower tooth row, including canine.	Observations.
H. h. schillingsi.														
B. E. A.: Sotik	163110	Female	218	150	81	39	47	52	88	46	169	89	96	Teeth considerably worn.
H. h. bergeri.														
B. E. A.:														
Archer's Post	182134	Male	202	140	78	39	47	46	80	43	157	83	91	Teeth moderately worn.
Do	182135	Female	200	133	75	35	42	44	79	43	154	86	92	Basal suture open.
Do	182136	...do	203	139	76	39	43	45	83	42	157	88	94	Teeth moderately worn.
Lakiundu River	182034	Male	214	157	82	38	49	51	87	47	168	91	99	Do.
Do	182045	...do	212	145	79	37	45	48	86	48	168	87	95	Do.
Do	182040	Female	195	140	74	36	44	46	78	42	154	83	91	Do.
Do	182047	...do	200	144	78	35	41	46	81	47	156	86	93	Do.
Merelle Water	182079	...do	193	136	70	31	40	44	78	39	152	83	90	Teeth considerably worn.
Do	182080	...do	204	134	73	33	43	43	83	44	153	88	92	Teeth moderately worn.
Do	182086	...do	205	149	75	41	48	48	81	46	161	84	93	Teeth much worn.
Do	182100	...do	200	139	76	39	43	47	79	41	155	85	93	Teeth moderately worn.
H. dubia.														
Sudan: Magangani	[1] 14909	Male	207	138	76	33	42	45	83	48	159	84	92	Teeth little worn.
Eritrea: Habesch	172923	Female	202	138	80	31	41	47	83	44	158	87	96	Teeth moderately worn.

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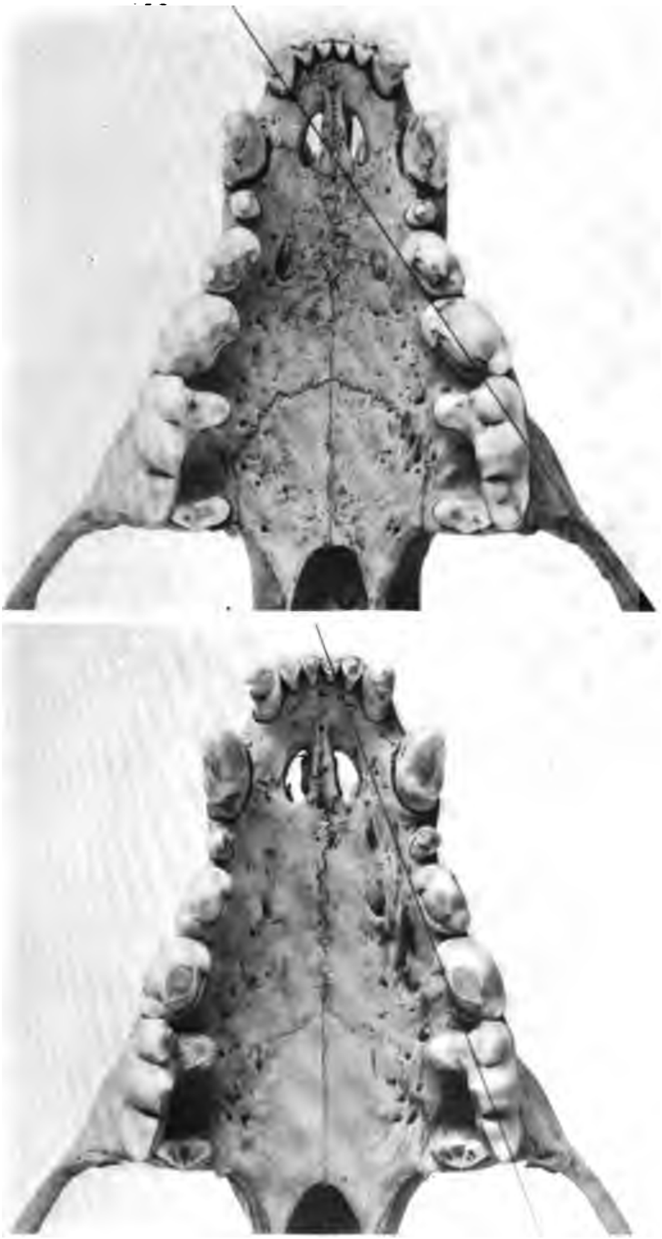
[1] Mus. Comp. Zoology at Harvard.

External and dental measurements of Hyæna.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Ear.	Upper carnassial.	Third upper premolar.	Alveolar length of upper canine.	Lower molar.
H. h. schillingsi.										
B. E. A.: Sotik	163110	Female	1100	300	218	150	31.2×18.2	21.5×13.8	14.4	19.9×10.7
H. h. bergeri.										
B. E. A.:										
Archer's Post	182134	Male	1020	325	200	138	29.7×17.3	19.2×13.3	13.5	19.3×10.5
Do	182135	Female	1020	335	207	142	29.2×18.2	20.2×12.7	13.7	19.2× 9.9
Do	182136	do	1020	335	198	138	29.9×18.7	20.2×12.8	13.7	20.8×10.2
Lakiundu River	182034	Male	1040	330	210	152	29.7×18.0	20.0×12.3	16.4	21.0× 9.8
Do	182045	do	1070	345	210	148	29.9×19.2	20.4×13.8	15.0	19.3×10.1
Do	182040	Female	940	350	190	140	30.0×18.0	20.3×13.1	14.3	19.9×10.2
Do	182047	do	990	325	200	150	28.3×16.7	18.6×11.3	13.2	20.3× 9.5
Merelle Water	182079	do	1020	330	195	140	27.8×17.2	18.7×12.5	14.4	19.0×10.1
Do	182080	do	970	340	192	148	30.1×16.8	18.9×11.7	12.2	20.3×10.0
Do	182086	do	1030	315	230	140	28.2×——[1]	18.7×12.8	15.5	18.8×10.1
Do	182100	do	960	370	205	148	30.5×17.3	19.7×12.9	14.7	20.5×10.0
H. dubia.										
Sudan: Magangani	[2] 140909	Male	1050	290	215	148	28.8×17.8	19.6×12.2	14.5	20.3× 9.8
Eritrea: Habesch	172923	Female	......	......	......	......	28.1×17.5	18.4×12.6	14.4	19.4×10.0

[1] Much worn.

[2] Mus. Comp. Zoölogy at Harvard.



UPPER FIGURE, HYAENA HYAENA BERGERI: LOWER FIGURE, H. DUBIA.

FOR EXPLANATION OF PLATE SEE PAGE 181.

in *dubia* does not cross the median suture of the palatine plates of the maxillæ, but crosses the inner incisor on the same side of the skull. (See pl. 3.) While the small first upper premolar in *dubia* is nearly anterior to the center of the front face of the larger second premolar, in *bergeri* it is directly in front of the anterior external corner of that tooth, so great is the difference in position of the larger premolar.

Genus CROCUTA Kaup.

1828. *Crocuta* Kaup, Isis, vol. 21, p. 1145. (*C. crocuta.*)
1829. *Crocotta* Kaup, Ent.-Gesch. Europ. Thierwelt, vol. 1, p. 78.

Numerous forms of the spotted hyena from many parts of Africa have been named by various authors. Most of these species have been based on color differences observed in very small series, or even between single examples of two supposed races. Great stress has been laid on the wide difference between gray, buff, and red examples, and on the color of the spots—black, brown, or red. Minor differences in the skulls have also been represented to be of specific importance. The splendid series of *carefully sexed* skins and skulls of these animals assembled in the United States National Museum by the Smithsonian and the Rainey expeditions has made possible a careful study of individual variation in a large number of specimens from the same region, and a comparison of suitable series from different localities. The results quite discredit many characters which have been considered as of primary importance in distinguishing species. Witnin a single series of specimens from the Sotik region, for example, are extremes of red and gray types, brown and black spotted types, spotted and unspotted shouldered examples, and remarkable variations in shape and size of the skull. Of more importance, however, are the numerous examples showing every degree of variation between extremes in all these characteristics.

For measurements of specimens see tables, pages 146–149.

CROCUTA CROCUTA GERMINANS (Matschie).

Plate 2.

1900. *Hyaena* (*Crocotta*) *germinans* Matschie, Sitz.-ber. Ges. nat. Freunde Berlin, p. 27. (Lake Rukwa, German East Africa; type in Berlin Museum.)
1910. *Hyæna crocuta germinans* Roosevelt, African Game Trails, Amer. ed., p. 473; London ed., p. 485.
1911. *Crocuta nzoyæ* Cabrera, Bol. Real Soc. Española Hist. Nat., vol. 9, p. 200. April. (Nzoia River, Guas Ngishu Plateau, British East Africa; type in collection of D. Ricardo de la Huerta, Madrid.)
1914. *Crocuta crocuta germinans* Roosevelt and Heller, Life-Hist. African Game Anim., vol. 1, p. 261.

Specimens.—Forty-six, from the following localities:

British East Africa: Guas Ngishu Boma, 1 (K. Roosevelt); Kabalolot Hill, Sotik, 10 (Heller, Rainey); Kampiya bibi, Guas

Ngishu Plateau, 4 (T. Roosevelt, K. Roosevelt); Kitanga Farm, 2 (K. Roosevelt, Mearns); Lake Naivasha, 3 skulls (Heller, Mearns); Loita Plains, 3 (Heller); Mtoto Andei, 1 (Heller); Nairobi, 2 skulls (Mearns); Nzoia River, Guas Ngishu Plateau, 4 (White, Heller); Southern Guaso Nyiro River, 4 (T. Roosevelt, Loring, Heller); Southwest side Mount Kenia, 3 (Heller, Loring); Telek River, Sotik, 7 (Heller); Ulukenia Hills, 1 skull (Loring).

German East Africa: Head of Wadiola River, 1 skull (E. Clark).

The weight of an adult male (basal suture closed) shot by Kermit Roosevelt on the Guas Ngishu Plateau was 120 pounds. Two adults, male and female, from the southwest side of Mount Kenia, weighed by Heller, are recorded at 136 pounds each. A female collected by Heller on the Telek River, May 18, was nursing two small cubs, which were trapped at the same time. On the Loita Plains, May 31, Heller removed two large fetuses from a female spotted hyena. These lived three days after being cut out of the dead female.

I am unable to distinguish by any character whatever the series of skins and skulls from the Guas Ngishu Plateau, topotypes of Cabrera's *Crocuta nzoyæ*, from the series collected in the Southern Guaso Nyiro and Sotik. Both series contain specimens bridging in every particular all variations in color and markings between red and gray types, between blackish and light brown spotted types, and between any extremes in shape and size of skull and teeth. No specimens from the type regions of Lönnberg's red and gray species from the Kilimanjaro region, *Crocotta kibonotensis*[1] and *Crocotta panganensis*,[2] are in our collection. As stated by Roosevelt and Heller,[3] the two extremes of color and length of tail on which these species are based are represented, with every intermediate stage, in the Sotik and Southern Guaso Nyiro series of specimens in the United States National Museum, and the validity of the forms is very questionable. In the light of the proved variability of *germinans*, the form described by Cabrera from Ankole, Uganda, *Crocuta thomasi*,[4] is also not satisfactorily diagnosed. We have no specimens from the type region.

Two very small pups in the collection are uniform seal-brown in color, without markings. Half-grown young are all dark gray in color, heavily spotted with black, and with black legs and feet. Larger young ones show more variation in color, but not such extremes of red and gray as in old adults.

Dimensions of all immature specimens have been excluded from the tables of measurements on pages 146–148.

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[1] Sjöstedt's Kilimandjaro-Meru Exped., p. 16. 1908.

[2] Idem, p. 18.

[3] Life-Hist. African Game Animals, vol. 1, p. 261. 1914.

[4] Proc. Zool. Soc. London, 1910, p. 98. March, 1911.

CROCUTA CROCUTA FISI Heller.

Plates 39, 40.

1914. *Crocuta crocuta fisi* Heller, Smithsonian Misc. Coll., vol. 61, No. 22, p. 5. January 26. (Merelle Waterholes, Marsabit Road, British East Africa; type in U. S. Nat. Mus.)

1914. *Crocuta crocuta fisi* Roosevelt and Heller, Life-Hist. African Game Animals, vol. 1, p. 263.

Specimens.—Seventeen, from localities as follows:

British East Africa: Archer's Post, 1 skull (Heller); Koya Water, Marsabit Road, 4 (Heller); Lakiundu River, 1 (Heller); Merelle Water, Marsabit Road, 9 (Heller); Northern Guaso Nyiro River, 1 (K. Roosevelt); Quoy Water, Marsabit Road, 1 skull (Heller).

The skins of this pale-colored, short-haired race of the spotted hyena are much more uniform in color and markings than are skins of the common East African *C. c. germinans*. The ground color of the body is light buff and the spots are small. This latter feature is due somewhat to the shortness of the pelage, which makes the markings seem more clear cut and distinct than in the long-haired race. The subspecific name is taken from the native name, *fisi*, by which the spotted hyena is known to the Swahili and other coast tribes.

CROCUTA CROCUTA LEONTIEWI (Satunin).

1905. *Hyaena* (*Crocuta*) *leontiewi* Satunin, Zool. Anz., vol. 29, No. 17, p. 556. November 28. (Abyssinia, exact locality not known; type in Petrograd Museum.)

Specimens.—Two, as follows:

Eritrea: "Habesch" (Schrader).

These two skins are pale cinnamon on the back, dirty buff on the flanks, and more reddish on the withers, neck, and head. On one the spots are very dark, almost black, while on the other they are pale brown. Both are in rather faded and worn pelage; the hair, except on neck and withers, is quite short, though longer than the body hair in *Crocuta c. fisi* of northern British East Africa.

The hyena described by Cabrera from Odweina, 100 miles south of Berbera, Somali, as *Crocuta rufopicta*[1] must be very close to, if not identical with, this form. None of the characters given in the original description, at any rate, are more than individual, as shown by the series of hyenas in the United States National Museum, and there is little reason to expect that more material would disclose any important constant differences between hyenas from the two localities.

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[1] Proc. Zool. Soc. London, 1910, p. 97. March, 1911.

Measurements of skulls of Crocuta.

Form and locality.	No.	Sex.	Condylo-basal length.	Zygomatic breadth.	Mastoid breadth.	Post-orbital constriction.	Inter-orbital constriction.	Rostral breadth over canine.	Lachrymal foramen to alveolar point.	Greatest length nasals.	Mandible.	Maxillary tooth row.	Lower tooth row, including canine.	Observations.
C. c. germinans.														
B. E. A.: Telek River	181527	Male	233	173	99	44	55	59	97	59	185	100	109	Basal suture closed.
Do	181529	...do	236	167	98	49	58	61	100	59	182	97	105	Basal suture open.
Do	181530	Female	240	164	95	45	58	62	98	60	182	98	106	Basal suture closed.
Kabalalot Hill	181518	Male	234	166	96	44	60	65	98	60	181	100	107	Do.
Do	181519	...do	225	155	92	43	53	57	89	51	172	94	101	Do.
Do	181520	...do	230	164	96	42	54	61	94	51	178	98	104	Do.
Do	181521	...do	238	166	98	43	53	59	97	65	180	100	106	Do.
Do	181525	...do	231	165	97	47	58	57	94	57	183	96	102	Do.
Do	181516	Female	237	164	97	46	53	59	96	52	177	100	108	Do.
Do	181522	...do	240	167	95	40	55	61	98	64	186	100	108	Basal suture open.
Do	181524	...do	254	174	100	44	57	61	101	60	192	106	113	Basal suture closed.
Do	181526	...do	236	156	91	38	51	60	93	59	179	99	109	Do.
Loita Plains	181534	...do	226	170	93	45	51	59	92	52	174	94	103	Do.
South Guaso Nyiro	162920	Male	228	157	90	39	48	59	91	60	176	96	104	Do.
Do	181515	...do	229	161	96	40	49	58	90	52	173	96	104	Do.
Southwest Mount Kenia	164502	...do	225	160	90	44	55	54	92	62	172	94	101	Do.
Do	163099	Female	244	163	93	40	48	59	96	67	189	98	108	Do.
Do	163299	...do	231	159	95	43	51	56	89	48	177	95	102	Basal suture open.
Nzoia River	163104	Male	224	147	90	44	48	58	92	47	....	95	104	Do.
Do	163344	...do	228	152	95	41	51	57	92	....	175	95	101	Do.
Do	173004	...do	221	160	92	41	51	58	89	55	172	96	101	Do.
Kampiya bibi	163102	...do	228	162	96	44	51	55	91	60	175	96	102	Basal suture closed.
Do	163101	Female	226	161	94	39	54	59	93	58	176	98	105	Do.
Do	163103	...do	233	164	91	37	52	60	95	51	177	99	105	Do.
Do	164506	...do	231	163	91	42	54	59	95	62	176	96	103	Do.
Guas Ngishu Boma	163105	...do	232	164	92	42	56	61	97	51	177	97	105	Do.

C. c. fisi.														
Merelle Water	[1] 182078	Male	230	156	93	47	57	59	91	53	176	95	102	Basal suture open.
Do	182091	...do	230	165	99	47	58	60	91	57	178	95	103	Do.
Do	182095	...do	235	163	93	43	54	58	94	58	181	98	104	Basal suture closed.
Do	182101	...do	232	162	97	44	51	57	91	50	178	98	106	Basal suture open.
Do	182103	...do	229	160	91	42	53	59	92	61	176	96	103	Do.
Do	182085	Female	225	164	94	44	58	56	89	62	175	94	....	Basal suture closed.
Lakiundu River	182032	...do	235	175	99	47	60	59	101	67	183	98	107	Do.
North Guaso Nyiro River	163100	...do	234	166	93	42	54	58	95	54	177	100	105	Do.
Koya Water	182105	Male	230	164	98	40	50	59	92	53	176	95	104	Basal suture open.
Do	182113	...do	242	162	96	48	59	58	98	54	180	101	109	Basal suture closed.
Quoy Water	182117	...do	229	160	99	44	53	59	90	53	173	94	101	Basal suture open.
Archer's Post	182210	Female	235	170	97	41	54	61	94	53	178	95	104	Basal suture closed.
C. c. leontiewi.														
Eritrea: Habesch	122544	....	....	170	98	45	62	63	103	63	189	103	115	Teeth moderately worn.
Do	172924	....	....	152	95	37	50	55	93	50	173	96	104	Basal sutnre open.

[1] Type.

External and dental measurements of specimens of Crocuta.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Ear.	Alveolar length of upper canine.	Upper carnassial.	Third upper premolar.	Lower molar.
C. c. germinans.										
B. E. A.: Telek River	181527	Male	1210	240	230	114	17.2	35.8×19.4	21.6×16.2	27.7×11.6
Do.	181529	do.	1160	300	230	104	17.7	34.9×18.6	21.8×15.8	25.8×11.1
Do.	181530	Female	1210	280	225	112	17.1	34.7×20.5	21.9×16.6	26.8×11.5
Kabalolot Hill	181518	Male	1240	......	210	105	19.0	37.6×21.7	23.2×17.1	28.4×11.6
Do.	181519	do.	1190	280	210	103	15.6	33.9×19.5	22.1×15.5	25.6×10.9
Do.	181520	do.	1280	300	240	108	17.3	35.2×19.4	21.7×15.5	26.2×11.4
Do.	181521	do.	1190	290	240	110	17.5	36.7×19.4	21.6×15.8	26.2×11.1
Do.	181525	do.	1180	275	230	115	15.5	32.9×18.1	20.8×14.2	24.8×10.5
Do.	181516	Female	1180	240	222	107	17.2	34.7×20.1	21.4×16.2	28.7×11.8
Do.	181522	do.	......	......	......	......	17.4	36.0×20.8	22.5×16.5	27.2×11.7
Do.	181524	do.	1320	280	215	115	......	36.4×21.0	24.2×16.0	28.9×11.8
Do.	181526	do.	......	......	......	......	17.7	36.7×21.5	22.7×17.2	29.7×12.0
Loita Plains	181534	do.	1180	290	205	105	18.6	34.0×20.1	22.0×15.1	27.4×11.8
So. Guaso Nyiro	162920	Male	1190	250	235	110	16.6	34.8×17.9	21.9×14.2	27.5×10.8
Do.	181515	do.	1140	265	220	103	16.9	34.7×19.6	19.7×14.9	26.2×10.7
S. W. Mount Kenia	164502	do.	1250	250	240	115	13.6	33.8×19.4	20.6×14.3	25.6×11.0
Do.	163099	Female	1300	280	245	110	15.1	33.7×18.8	20.2×15.4	26.3×11.2
Do.	163299	do.	1130	230	253	......	16.0	36.4×20.1	21.8×17.2	27.1×11.2
Nzoia River	163104	Male	1050	320	220	110	17.0	34.3×20.2	22.7×16.2	27.2×11.7
Do.	163344	do.	1115	270	220	110	16.7	34.8×20.0	22.2×15.9	25.2×11.0
Do.	173004	do.	......	......	......	......	16.5	35.1×20.3	22.0×15.6	25.8×11.3
Kampiya bibi	163102	do.	......	310	230	110	18.2	33.8×18.7	21.0×14.4	25.7×10.7
Do.	163101	Female	1310	300	215	110	18.3	34.2×21.1	23.0×16.5	25.9×11.4
Do.	163103	do.	......	290	230	108	17.5	35.4×20.7	23.1×17.5	28.0×12.2
Do.	164506	do.	1250	320	220	115	17.5	32.7×18.5	21.3×16.4	26.0×11.3
Guas Ngishu Boma	163105	do.	1300	280	220	......	16.0	35.9×18.8	22.8×16.4	26.3×11.3

C. c. fisi.										
Merelle Water	[1]182078	Male	1150	295	225	100	15.8	35.0×20.5	22.1×16.5	26.0×11.0
Do	182091	do	1200	270	285	112	16.3	35.6×19.9	21.6×16.2	26.0×11.1
Do	182095	do	1180	300	230	110	17.5	36.8×21.3	22.5×16.9	28.1×11.8
Do	182101	do	1160	310	235	110	16.4	34.6×19.9	22.6×14.9	26.9×11.2
Do	182103	do					16.4	37.1×19.0	22.0×16.3	27.5×11.6
Do	182085	Female	1190	270	220	112		32.9×19.7	21.5×15.1	26.2×11.5
Lakiundu River	182082	do	1170	275	230	108	16.7	33.3×18.8	21.4×14.8	26.7×11.3
N. Guaso Nyiro River	163100	do					19.3	37.0×20.4	22.8×16.5	27.8×11.7
Koya Water	182105	Male					16.6	35.7×20.0	21.9×16.0	27.4×11.5
Do	182113	do					17.5	36.3×20.9	23.3×15.9	28.5×12.0
Quoy Water	182117	do	1200	265	235	111	16.1	38.0×19.3	21.6×15.0	24.9×10.9
Archer's Post	182210	Female					15.9	32.0×17.9	21.5×15.1	25.5×10.2
C. c. leontiewi.										
Eritrea: Habesch	122544						17.4	38.2×21.2	22.5×17.2	30.3×12.3
Do	172924						15.2	35.0×19.5	21.5×15.9	26.6×11.0

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[1] Type.

Family FELIDÆ.

Genus ACINONYX Brookes.

1828. *Acinonyx* BROOKES, Cat. Anat. & Zool. Mus. Joshua Brookes, p. 16. (*A. venatica*.[1])

1830. *Cynailurus* WAGLER, Nat. Syst. Amphib., p. 30. (*A. jubatus*.)

1907. *Acinonyx* ELLIOT, Field Mus., Zool. ser., vol. 8, p. 396.

1911. *Acinonyx* HOLLISTER, Proc. Biol. Soc. Washington, vol. 24, p. 225. October 31.

The African cheetah, *Acinonyx jubatus* (Schreber),[2] has been divided into several subspecies by recent authors. Some of these geographic races are doubtless well marked, but the practice of naming subspecies based upon living animals in zoological parks and upon descriptions taken from old works like Wagner, 1841, as applied by Hilzheimer,[3] can not be too strongly condemned. The older accounts of mammals are often too inaccurate for subspecific determination and zoological park specimens are frequently of uncertain origin. Captive animals are often traded and sold, and on the death of an individual which is really the type-specimen of the race, all trace of it has been lost and it is not preserved for reference in any collection. The name applied to the form thus becomes doubly doubtful, as no description based upon a living animal, however carefully prepared, is sufficiently accurate for the determination of subspecies if the exact locality is uncertain. Mammals kept in captivity in strange climates change the color of the coat so decidedly and so rapidly that such accounts of fine differences in shade or tone of ground color or markings are absolutely valueless.

Colonel Roosevelt states that the cheetahs prey on the smaller antelopes, occasionally taking something as big as a half-grown kongoni. Regarding the speed of the cheetah he writes:

> For a short run, up to say a quarter of a mile or even perhaps half a mile, they are the swiftest animals on earth, and with a good start easily overtake the fastest antelope; but their bolt is soon shot, and on the open plain they can readily be galloped down with a horse.[4]

For measurements of specimens of cheetahs see pages 153–154.

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[1] The type-species of *Acinonyx* is *Acinonyx venator* Brookes, by monotypy. The name is a synonym of *Felis venatica* Smith, Griffith's Cuvier, vol. 5, p. 166, 1837, the Indian cheetah. A reexamination of the copy of Brookes's Catalogue in the Library of the Surgeon General's Office convinces me that the name "*Acinonyx guepard*," which has been cited from Brookes, does not occur at any place in the work, even as a *nomen nudum*. The names occur in this form: "Acinonyx. Gue'pard." (p. 33.) They signify the technical and common names of the genus. The generic name *Acinonyx* and the specific name *A. venator* are valid only on page 16 of the "Catalogue," where the genus is properly diagnosed.

[2] Dr. Max Hilzheimer has attempted to show that this name should apply to the Indian cheetah, on the basis of the coloring of the wretched picture in Schreber's Säugthiere (pl. 105). The plate in question is barely identifiable as to genus, much less as to species or subspecies, and the type-locality of *jubatus* is fixed as the Cape of Good Hope from Schreber's text (vol. 3, pp. 392–393). See Hollister, Proc. Biol. Soc. Washington, vol. 24, pp. 225–226, October 31, 1911; Hilzheimer, Sitz.-ber. Gas. nat. Fr. Berlin, 1913, pp. 283-292; and Hollister, Proc. Biol. Soc. Washington, vol. 27, p. 216, October 31, 1914.

[3] Sitz.-ber. Ges. nat. Freunde Berlin, 1913, pp. 283-292.

[4] African Game Trails, p. 124. 1910.

ACINONYX JUBATUS RAINEYI Heller.

Plates 5, 41.

1910. *Cynælurus jubatus guttatus* ROOSEVELT, African Game Trails, Amer. ed., p. 476; London ed., p. 487. (Part; not of Hermann.)

1913. *Acinonyx jubatus raineyi* HELLER, Smithsonian Misc. Coll., vol. 61, No. 19, p. 9. November 8. (Ulu Station, Kapiti Plains, British East Africa; type in U. S. Nat. Mus.)

1914. *Acinonyx jubatus raineyi* ROOSEVELT and HELLER, Life-Hist. African Game Animals, vol. 1, p. 428.

Specimens.—Six, from localities as follows:

BRITISH EAST AFRICA: Juja Farm, Athi Plains, 1 (McMillan); Kapiti Station, 1 (Rainey); Ulu Station, 3 (Rainey); Wami Hill, Kapiti Plains, 1 (K. Roosevelt).

This is a very slightly marked form of the cheetah, barely recognizable from *Acinonyx jubatus velox.* There are three skins of fully adult animals in the collection, and when these are compared with the series of *velox* a few average differences in color are noticeable, but these are by no means well marked or constant. The peculiar pinkish cast to the buffy ground color is almost matched in intensity by two skins from the Loita Plains; and the larger, less thickly placed body spots, and slightly less heavily marked feet are also characteristics closely (though not quite) matched in certain skins of *velox.* It is desirable that more skins of *raineyi* be obtained for further study.

The cheetah described by Hilzheimer from Ngorongoro, south of Lake Natron, German East Africa, as *Acinonyx guttatus ngorongorensis*,[1] should be, theoretically, the same form as this. There are certain discrepancies in the description, however, which make it unsafe to combine the two without better evidence. The type of *ngorongorensis* is said to be in ground color "Isabella yellow-brown," the underside "very light Isabella entirely without white;" the cheeks grayish, the back of the ear "yellow, with a slender black stripe at the base." All of these statements disagree with the specimens of *raineyi* which are distinctly pinkish-buff in ground-color; the belly is largely white, the cheeks not grayish, and the ear has the normal wide black area across its base. Hilzheimer's description was drawn up from a specimen living in the Leipzig Zoological Garden and may be faulty; the animal may have changed color greatly, as captive cats in strange climates are known to do; or the locality may be erroneous. Cheetahs are sometimes captured by natives and traded alive, and might reach Europeans some distance from the original point of capture. The name has priority over *raineyi*, and additional specimens from the Ngorongoro district are greatly desired as an aid in settling its status.

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[1] Sitz.-ber. Ges. nat. Freunde Berlin, 1913, p. 290.

ACINONYX JUBATUS VELOX Heller.

Plate 42.

1910. *Cynælurus jubatus guttatus* Roosevelt, African Game Trails, Amer. ed., p. 476; London ed., p. 487. (Part; not of Hermann.)

1913. *Acinonyx jubatus velox* Heller, Smithsonian Misc. Coll., vol. 61, No. 19, p. 7. November 8 (Agate's, Loita Plains, British East Africa; type in U. S. Nat. Mus.).

1914. *Acinonyx jubatus velox* Roosevelt and Heller, Life-Hist. African Game Anim., vol. 1, p. 246.

Specimens.—Thirteen, from the following localities:

British East Africa: Agate's, Loita Plains, 3 (K. Roosevelt, Heller); Engare Ndare River, 1 skull (Johnston); Laikipia, 2 (K. Roosevelt); Lime Springs, Southern Guaso Nyiro, 2 (K. Roosevelt); Loita Plains, 4 (Rainey); Nzoia River, Guas Ngishu Plateau, 1 skull (White).

The skull from the Guas Ngishu Plateau, I doubtfully place with this form. It is so much larger than any skull of *velox* or of *raineyi* in the collection that the difference in size can not be due entirely to greater age, although it is from an animal unquestionably older than any others in the series. With no skins from the Guas Ngishu country and no skulls of *Acinonyx jubatus sœmmeringii* from Kordofan for comparison, it seems best at present to consider it an extraordinarily large skull of *velox*. The distribution of this cheetah is given by Roosevelt and Heller as "from the Rift Valley and Laikipia Plateau westward over the highland country as far as the Nile lowlands; north to the latitude of Nimule and south through German East Africa." [1]

ACINONYX JUBATUS SŒMMERINGII (Fitzinger).

1855. *Cynailurus sœmmeringii* Fitzinger, Sitz.-ber. Math.-nat. cl. d. K. acad. Wiss., vol. 17, hft. 2, p. 245. (Bajuda Steppe, Kordofan.)

1911. *Acinonyx sœmmeringii* Hollister, Proc. Biol. Soc. Washington, vol. 24, p. 226. October 31.

1913. *Acinonyx wagneri* Hilzheimer, Sitz.-ber. Ges. nat. Freunde Berlin, No. 5, p. 285. (Kordofan; based on description of specimen, collected by Rüppell, in Wagner's Schreber Säug., Suppl., vol. 2, p. 503, 1841.)

1914. *Acinonyx jubatus sœmmeringii* Roosevelt and Heller, Life-Hist. African Game Anim., vol. 1, p. 249.

Specimen.—One skin, as follows:

Sudan: El Dueim, White Nile (Mearns).

This skin indicates a well-marked form, in which the spots are much reduced in number and in size. The ground color of the upperparts is decidedly "pinkish-buff," much as in *A. j. raineyi* of the British East African lowlands.

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[1] Life-Hist. African Game Animals, vol. 1, p. 246. 1914.

Measurements of skulls of Acinonyx from British East Africa.

Form and locality.	No.	Sex.	Condylobasal length.	Greatest length.	Zygomatic breadth.	Mastoid breadth.	Interorbital constriction.	Rostral breadth over canine.	Lachrymal foramen to alveolar point.	Greatest length nasals.	Mandible.	Maxillary tooth row.	Lower tooth row, including canine.	Observations.
A. j. raineyi.														
Kapiti Station	[1] 182321	Male	162	180	122	68	39.2	49	65	56	127	55.1	59.3	Basal suture open.
Ulu Station	182319	Female	154	170	120	69	38.6	46	59	55	116	50.6	54.5	Basal suture closed.
Do.	182322	...do.	157	179	122	70	40.7	49	65	60	122	53.0	56.8	
Wami Hill	161922	Male	169	190	133	73	41.8	52	68	63	131	56.0	62.0	Do.
A. j. velox.														
Agate's	[1] 163096	Male	163	179	136	75	39.9	52	62	56	128	53.8	59.6	Basal suture closed.
Do.	163097	Female	146	162	119	65	39.0	46	60	54	112	52.0	55.4	Do.
Do.	163098	...do.	155	172	121	66	38.2	47	61	55	118	51.7	55.3	Do.
Lime Springs	162928	...do.	150	165	122	67	38.0	46	60	53	117	50.5	54.6	Do.
Do.	162929	...do.	153	173	120	69	38.8	47	65	55	115	52.8	57.1	Do.
Loita Plains	181596	Male	167	183	126	70	40.4	50	64	59	125	57.8	61.3	Basal suture open.
Do.	181597	...do.	170	190	129	74	41.5	52	69	62	133	57.9	62.9	Basal suture closed.
Do.	181598	...do.	165	183	127	73	43.9	52	68	54	130	57.8	60.8	Basal suture open.
Ngare Ndare River	182698	Female	154	173	117	66	36.7	46	62	55	118	50.8	54.2	Do.
Laikipia	163090	Male	155	173	125	71	40.1	49	63	58	....	52.5	57.1	Do.
Do.	163091	Female	153	170	120	66	39.5	47	61	52	118	51.2	55.6	Basal suture closed.
Guas Ngishu Plat.	173001	Male	176	200	144	79	46.2	56	74	67	138	58.4	62.3	Do.

[1] Type.

External and dental measurements of specimens of Acinonyx from British East Africa.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Ear.	Alveolar length of upper canine.	Upper carnassial.	Second upper premolar.	Lower molar.
A. j. raineyi.										
Kapiti Station	[1] 182321	Male	......	......	......	......	11.2	22.1× 9.1	14.6×6.4	17.6×7.4
Ulu Station	182319	Female	......	......	......	......	10.1	22.5× 8.8	12.9×5.7	17.1×7.2
Do	182322	do	......	......	......	......	10.7	23.7× 9.4	13.0×6.2	17.6×7.5
Wami Hill	161922	Male	1260	775	300	43	11.8	23.6× 9.3	14.8×6.6	18.9×7.8
A. j. velox.										
Agate's	[1] 163096	Male	1300	740	300	80	12.0	22.7× 9.7	14.3×6.2	17.8×7.4
Do	163097	Female	1220	720	280	80	10.3	22.6× 8.9	14.0×6.3	17.6×7.5
Do	163098	do	1230	800	285	78	10.0	22.2× 9.1	13.3×5.9	16.8×7.5
Lime Springs	162928	do	1250	750	290	80	10.0	20.9× 8.6	13.3×6.1	16.5×7.2
Do	162929	do	1240	750	290	80	10.4	22.8× 8.7	13.3×6.3	17.1×7.5
Loita Plains	181596	Male	1120	780	280	82	11.8	22.7× 9.5	14.2×6.9	17.6×7.7
Do	181597	do	1170	790	287	80	11.9	23.4× 9.2	14.8×6.5	17.7×7.7
Do	181598	do	1150	755	285	78	11.8	23.6× 9.4	14.5×6.1	17.6×7.6
Ngare Ndare River	182698	Female	1140	750	270	72	9.8	21.2× 8.7	13.1×6.5	16.4×7.2
Laikipia	163090	Male	......	......	......	......	10.9	23.1× 9.0	13.5×6.7	17.5×7.5
Do	163091	Female	......	......	......	......	10.1	22.4× 9.2	13.7×6.6	......
Guas Ngishu Plat	173001	Male	......	......	......	......	12.2	23.2×10.2	14.8×7.0	18.7×7.9

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[1] Type.

Genus FELIS Linnæus.

1758. *Felis* Linnæus, Syst. Nat., ed. 10, p. 41. (*F. catus.*)
1816. *Panthera* Oken, Lehrb. Nat., 3ter Theil, 2te Abth., p. 1052. (*F. pardus.*)
1816. *Leo* Oken, Lehrb. Nat., 3ter Theil, 2te Abth., p. 1070. (*F. leo.*)
1855. *Catus* Fitzinger, Wiss.-pop. Nat. Säug., vol. 1, p. 265. (*F. catus.*)
1858. *Catolynx* Severtzow, Rev. Mag. Zool., Paris, ser. 2, vol. 10, p. 385. September. (*F. silvestris=F. catus* Authors.)
1858. *Leptailurus* Severtzow, Rev. Mag. Zool., Paris, ser. 2, vol. 10, p. 389. September. (*F. serval.*)
1864. *Serval* Brehm, Führer Zool. Garten Hamburg. Sechste Auflage, p. 53. (*Serval maculatus* from Algeria.)
1866. *Galeopardus* Fitzinger, Sitz.-ber. Math.-Nat. Kais. Akad. Wiss., Wien, vol. 54, p. 557. (*F. serval.*)
1894. *Leonina* Grevé, Nov. Act. Acad. Cæs. Leop., vol. 63, p. 60. (*F. leo.*)
1894. *Servalina* Grevé, Nov. Act. Acad. Cæs. Leop., vol. 63, p. 76. (*F. serval.*)

Four groups of cats of the genus *Felis* are included in our East African collections. These are the lions, leopards, servals, and the small wild cats. The larger species, the lion and the leopard, are much better represented in the collection than are the smaller serval and the much smaller wild cat. The four groups have been considered by various authors as distinct genera, but until a carefully worked out monograph of the superspecific groups of cats appears it seems of little use to separate them.[1] The African wild cat is very closely related to the wild cat of Europe, and is generally believed to be the ancestral species of the common domestic cat.

FELIS LEO MASSAICA Neumann.

Plates 4, 52, 53, 54, 55.

1900. *Felis leo massaicus* Neumann, Zool. Jahrb., Syst., vol. 13, p. 550. (Kibaya, German East Africa; type in Berlin Mus.)
1908. *Felis leo* subsp. *sabakiensis* Lönnberg, Sjöstedt's Kilimandjaro-Meru Exped., Mamm., p. 22. (Kibonoto and Leitokitok, German East Africa.)
1910. *Felis leo sabakiensis* Hollister, Smithsonian Misc. Coll., vol. 56, No. 2, p. 11. March 31.
1910. *Felis leo massaica* Roosevelt, Afr. Game Trails, Amer. ed., p. 476; London ed., p. 487. (Part.)
1914. *Felis leo massaica* Roosevelt and Heller, Life-Hist. Afr. Game Anim., vol. 1, p. 222; map, p. 227. (Part.)
1917. *Felis leo massaica* Hollister, Proc. U. S. Nat. Mus., vol 53, p. 177. June 1.

Specimens.—Fifty-nine from the following localities:

British East Africa: Guas Ngishu Plateau, 1 (White); Kapiti Station, 24 (Rainey, Loring, Johnston); Kitanga, 5 (T. Roosevelt, Rainey); Laikipia Plateau, 4 (K. Roosevelt); Lakiunda River, 1 (Heller); Marsabit Road, 1 (Heller); Mount Kilimanjaro, northeast side, 2 (Abbott); Mount Lololokwi, 1 (Heller); Mtheka Hill, near Ulu, 1 (Johnston); Nairobi, 6 (McMillan, White); Northern Guaso Nyiro River, 1 (K. Roosevelt); Ulu, 7 (Rainey); Ulukenia Hills, 1 (Rainey); Useri River, 15 miles east of Kilimanjaro, 1 (Abbott); Wami Hill, Kapiti Plains, 3 (T. Roosevelt).

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[1] Since this page has been in type a paper on The Classification of Existing Felidæ, by R. I. Pocock, has appeared in the Annals and Magazine of Natural History, series 8, vol. 20, pp. 329–350, November, 1917. According to Mr. Pocock, the lion and leopard belong to the genus *Panthera;* the serval to the genus *Leptailurus;* and the small wild cats, together with the domestic species, to the restricted genus *Felis*.

Included in this series are 27 adult specimens, the skulls of which show full maturity. Other almost fully grown animals are, as shown by the sutures of the skulls, not fully matured. There is an excellent series of young of all ages, from tiny kittens to those nearly grown.

The Massai or East African lion is a distinctly light-colored, short-haired race. The males are usually decidedly grayish or light buff in color and are easily distinguished by this character from the darker, more ochraceous, and longer-haired Uganda lion, which ranges southeast to the Loita Plains and Southern Guaso Nyiro River. The females are darker and richer colored than the males and differ from females of the Uganda race only by a slight average paler coloration. The younger animals differ from the immature specimens of *nyanzæ* in the same slight degree. I can find no constant and reliable characters by which the skulls of the two races may be distinguished. In reporting on a collection of mammals from British East Africa in 1910,[1] I referred lions from Nairobi to *Felis leo sabakiensis* Lönnberg, described from Mount Kilimanjaro. With such a large series of skins and skulls as the museum now possesses for study and comparison, I am unable to recognize this race, which was founded on individual characteristics of female specimens.

The range of *Felis leo massaica* as mapped by Roosevelt and Heller[2] includes all of German and British East Africa westward to the shores of Victoria Nyanza; but the excellent series of specimens now preserved in the United States National Museum proves that the lions of the Southern Guaso Nyiro and Sotik are separable from the Nairobi, Kapiti Plains, and Kilimanjaro animals, and are better placed with the form described by Heller from the northern shore of Victoria Nyanza, *Felis leo nyanzæ*. I can not distinguish skins and skulls from the region north of Mount Kenia from specimens killed on the Kapiti Plains and in other southern localities. Lönnberg[3] has referred a specimen from the Northern Guaso Nyiro to the Somaliland race, but our somewhat more plentiful material does not justify such a conclusion. A single skin from the Guas Ngishu Plateau is clearly of the East African rather than of the Uganda form.

While on the whole there is remarkable uniformity in skulls of this lion, there are a few cases of considerable individual variation in size of fully adult examples, as shown in the accompanying tables of

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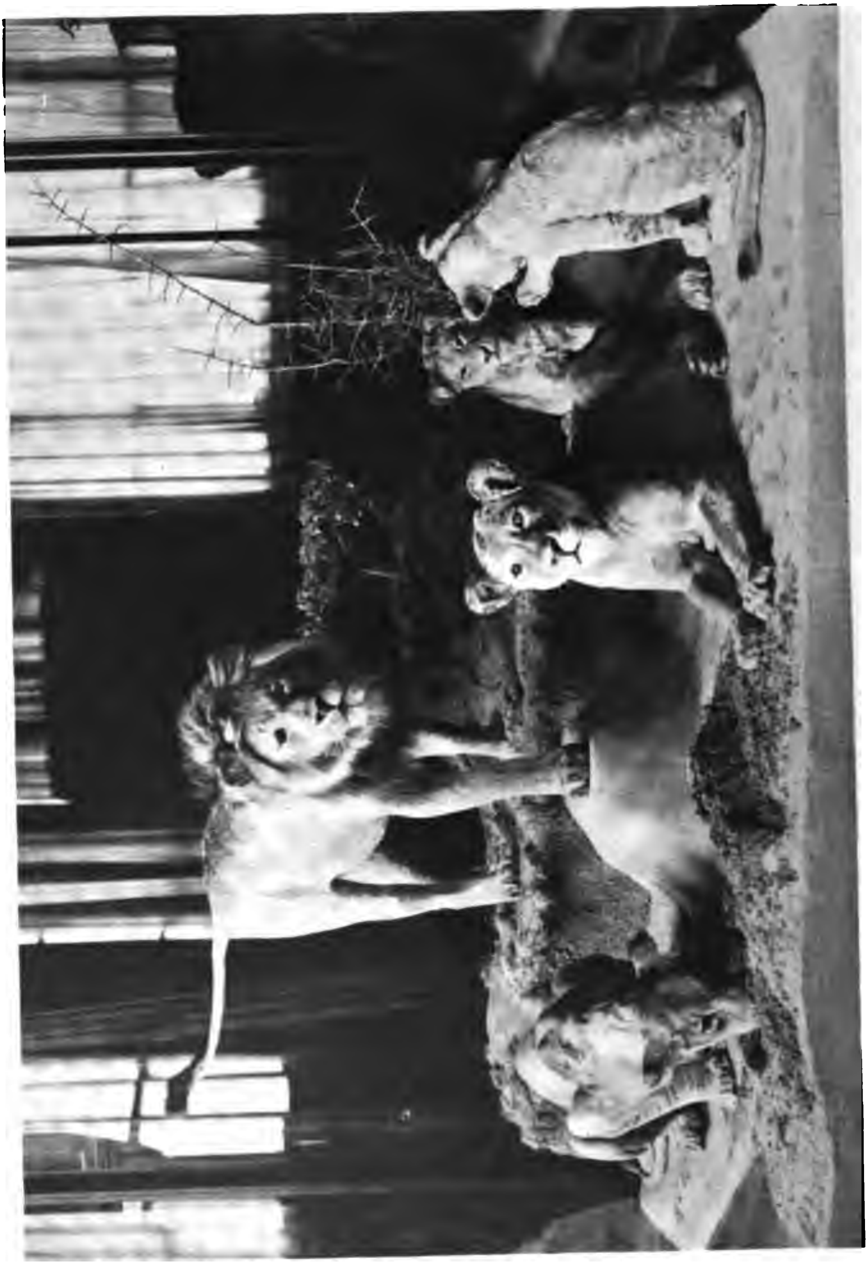
[1] Smithsonian Misc. Coll., vol. 56, No. 2, pp. 1-12. March 31, 1910.

[2] Life-Histories of African Game Animals, vol. 1, p. 227. 1914.

[3] Kungl. Svenska Vet. Handl., vol. 48, No. 5, p. 74. 1912.



GROUP OF EAST AFRICAN LIONS IN UNITED STATES NATIONAL MUSEUM.

FOR EXPLANATION OF PLATE SEE PAGE 181

cranial and dental measurements. Skulls and teeth of females vary much more than do those of males. The range of variation in size of the teeth in lionesses from one locality is startling. There is great variation in the shape and size of the auditory bullæ in skulls from one locality.

Out of seven wild-killed adult males, with manes well grown, only two are "black-maned" lions. A skin collected by Doctor Abbott near Kilimanjaro has the entire mane almost pure black, and one collected by Kermit Roosevelt on the Laikipia Plateau has the mane largely black. From the same localities are yellow-maned lions with scarcely a trace of black in the hair of the head, neck, and shoulders. Several others have slight traces of black in the manes, but the ordinary condition seems to be the almost purely "yellow-maned" type.

The following notes on the type-specimen of *Felis leo massaica* were made by Heller in Berlin:

Type ♂ old, A5586. Skin mounted and on exhibition. Skull perfect except for right side of mandible which is broken in half and the posterior half missing. Sphenoidal sutures closed. Greatest length, 358; condylo-incisive length, 320; zygomatic breadth, 328; interorbital breadth, 74; postorbital breadth, 62; nasals 100 × 62; length upper carnassial, 38; length of mandible, 240; width audital bullæ in front, 35; width foramen magnum, 27; height of foramen magnum, 22.

One of the most interesting results of the study of the large series of lions now preserved in the museum is the discovery of the definite variations existing between wild-killed animals and those which have been reared in captivity. This has been described in detail in a special paper.[1] An outline of the most important features of this paper is given below.

Lions in zoological parks are often dealers' specimens without definite history, or animals born in captivity; but in the series of specimens of *Felis leo massaica* in the National Museum collection are five adult lions which were captured as small cubs in the region near Nairobi, in practically the same locality where many of our wild-killed specimens were obtained. They were presented to the National Zoological Park by Mr. W. N. McMillan, and are known as the "McMillan lions." At the time of their arrival in Washington they were from 22 to 30 months old. All of these lions were adult at the time of death and four of them lived to complete maturity, or from six years and two months to seven years and eight months of age.

In addition to giving reliable information as to the age when lions reach full maturity, with the skull fully developed, the basisphenoid suture ankylosed, and the sagittal crest completely formed, these specimens furnished an opportunity for direct comparison between wild-killed and park-reared specimens known to be of the same age. The latter present a striking case of definite structural modification of the skull by habit. This is accompanied by a change in color, the nature of which is equally definite, but the cause of which is less easy to understand.

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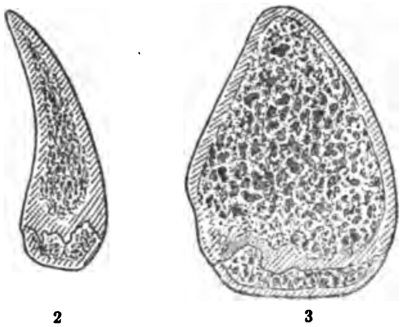
[1] Some Effects of Environment and Habit on Captive Lions, Proc. U. S. Nat. Mus., vol., 53, pp. 177-193, pls. 22-25. June 1, 1917.

The lions brought from the relatively dry highlands of East Africa became darker in color with each successive moult. The degree of color change was therefore in direct relation to the period of life in Washington. The effect of five years of such life has been to change the color of living examples of *Felis leo massaica* from the normal pale grayish-buff color of the race to a much darker color very much resembling that of *Felis leo nyanzæ*, the lion of the more humid Victoria Nyanza region. The cause of this color change is unknown, though humidity is probably a factor of some importance. Captive lions also develop much finer manes and at an earlier age than do wild animals of the same kind.

Of greater interest in the study of the McMillan lions compared with wild examples from the same region are the modifications in the skulls. In all adult captive animals the skulls have a definite, uniform shape, differing from those of wild-killed lions in a number of conspicuous characters. They are broader and shorter, more massive and bulky, and exhibit abundant relative differences which would be instantly accepted as of "specific" value in wild animals. The obvious reason for the peculiarities of the zoo-reared individuals is that the principal muscles operating the jaws and neck (those muscles used by a wild lion in mauling and killing game, biting, gripping, and shaking) have had so little work to do that they have had relatively little influence in moulding the shape of the bones to which they are attached. In a wild lion which habitually kills quantities of heavy game, these muscles are much used, and in a normal way they mould the growing skull.

The most conspicuous peculiarities of the McMillan lion skulls, and of other zoo-reared lions as well, are the greater (relative and actual) zygomatic breadth, the large rostra, and the great distance across the base of the skull at the mastoids. While actually measuring less in condylobasal or greatest length than many of the wild *massaica* skulls of equal age, they have a far greater zygomatic breadth than any, averaging about 30 millimeters more in males, and 20 millimeters more in females. (See detailed measurements, pages 166–167, and plates 52–54.) The different regions of the skull may be compared in detail:

Regions of attachment of the masseter muscle.—Contrary to the usual textbook definition of its function, the masseter muscle unquestionably furnishes the chief gripping power; it is the one most exercised during use of the canine and incisor teeth. While there is intimate relationship between the functions of the masseter and temporal muscles, and the two masses are actually connected, each nevertheless is the prime factor in the definite mechanical action of separate parts of the dental row. While the masseter, as stated above, has primarily to do with the front teeth (the canines and incisors), the temporal is chiefly concerned with the molar-premolar row, and the process of cutting and chewing rather than biting and gripping. The lion, like all cats, is a biting animal of the highest type. The masseter, aided by the temporal and internal pterygoid muscles, locks the jaw and makes the grip firm. It is attached to almost the entire length of the inner side of the zygoma, from just back of the molar tooth to the pit on the upper side of the squamosal root, and to the ventral half of the outer surface from near the maxillary tuberosity to near the glenoid surface. The region of its origin in the McMillan skulls is greatly changed from the wild type. The malar and the zygomatic process of the temporal bone have been almost uninfluenced by the muscle and have to a certain degree retained distinctive characters of juvenility. In wild lions this muscle has exercised very great influence on the bones of the zygomatic arch. The following characters, which appear to be largely due to the nonaction of this muscle, separate easily the McMillan lion skulls of either sex from wild skulls of equal age: Zygoma more spreading anteriorly; malar very thick and wide; squamosal arm subterete and heavy, almost rounded in cross section and not at all concave on inner surface, with no superior margin for strong muscle attachment [in skulls of wild-killed specimens the squamosal arm of the zygoma is thin and light, but strong; it is greatly hollowed out on inner surface and has a sharp superior margin]. The region of insertion, the outer lateral face of the ascending mandibular ramus, is also greatly modified. In the McMillan skulls it is comparatively heavy and thick, but is smooth and poorly fitted for muscle attachment. The margin is smooth and rounded. The great zygomatic breadth of the skull of the captive lion is partly due to the rounded squamosal arm.



FIGS. 2-3.—CROSS SECTIONS OF ZYGOMATA OF WILD-KILLED AND PARK-REARED LION SKULLS, MADE AT INFERIOR POINT OF ZYGOMATICO-TEMPORAL SUTURE.—(2) WILD-KILLED (NO. 155443, NAIROBI. BRITISH EAST AFRICA); (3) PARK-REARED (NO. 199707, "MCMILLAN LION.") ADULT MALES OF EQUAL AGE. NAT. SIZE.

Regions of attachment of the temporal muscle.—The chief function of the temporal muscles is to apply to the cheek teeth the power needed for the crushing and cutting up of the food killed by the canines and incisors. As the lions in the Zoological Park are always fed with pieces of meat containing large bones, in order to guard against the natural tendency of carnivores to bolt their food without chewing, the temporal muscles are used by them in an essentially normal way. These muscles, unlike the disused masseters, have moulded the parts of the growing skull to which they are attached in more nearly the same manner as in wild individuals. The region of origin, the entire side of the skull posteriorly, is somewhat modified. The braincase has been less subjected to pressure by these powerful muscles than in the wild lion, and it, as a consequence, is less compressed laterally. Wild lion skulls of equal age have smaller braincases, and more sharply marked sagittal and lambdoidal crests. The region of insertion, the inner surface of the ascending ramus, is slightly smoother in the McMillan skulls, but is little modified.

The mastoid and occipital regions.—These regions are, except for the squamosal arm of the zygoma, the most modified parts of the park-reared lion skulls. The change from the uniform type found in the wild lion is very great. The mastoid breadth in the McMillan lions is far greater than is usual in wild skulls of equal age; the mastoids are broad and spreading, with the large, smooth, postero-external surfaces next to the paroccipital process only slightly turned forward from the general occipital plane, and without sharply marked marginal ridges [in wild lions the mastoid breadth is usually much less, the sides are drawn in and forward, so that the postero-external surfaces of the mastoids lie in a position at a much greater angle from the general occipital plane; marginal ridges sharply recurved; paroccipital process longer and more angular]. (See pl. 55.)

Nondevelopment of the muscles chiefly used in lifting and shaking prey and the consequent lack of necessity for strong attachments is clearly responsible for this peculiarity in the park-reared animals. The splenius, complexus, rhomboideus capitis, cleido-mastoid, sterno-mastoid, rectus capitis posticus major, and rectus capitis posticus minor all attach to the affected parts. A powerful splenius is necessary in the wild lion, as the beast commonly carries heavy prey for long distances; the well-developed rhomboideus capitis aids in this work. The complexus and mastoid muscles are of great power in the shaking process and are, like the splenius and other closely related muscles, naturally less developed in the animal reared in captivity. The digastric muscle, of quite another function, but powerfully developed in the cat, and having its origin on the paroccipital process and inward, bordering the posterior margin of the auditory bullæ, is no doubt somewhat responsible for the development of shape in this part of the skull as well. After a preliminary movement of the hyoid muscles, it is the chief agent for depressing the jaw. The cephalo-humeral and other muscles and the ligamentum nuchæ attach to the base of the skull, but in this problem are of little importance.

The mastoid breadth in a wild-killed adult male lion from Nairobi (No. 155443) is 135 millimeters; in a McMillan lion of the same age (No. 199707) it is 152.

The lambdoidal ridge and occipital bones are broader in the McMillan skulls than in any skulls of wild lions. Here again the splenius and complexus muscles, through nondevelopment, have failed to influence the bone as in a normal wild lion whose life is one of tearing and shaking of strong prey.

Capacity of the braincase.—As stated above, external measurements of the braincase in wild lions are less than in park-reared animals of equal age. The capacity of the braincase, however, is considerably greater. Young adults of each, as usual among carnivores, have greater braincase capacity than old or aged adults. The bones forming the cranium of the zoo lion are thicker, and the actual size of the brain is less than in wild-killed examples. In the case of the McMillan lions the capacity is about 50 cubic centimeters less in males and about 40 less in females, than in wild-killed examples of equal age from the same locality.

The "Richardson lion," from the New York Zoological Park, celebrated as the record skull for greatest breadth, and the Menelik lion, the type-specimen of *Felis leo roosevelti*, are both park-reared animals of uncertain history but they show the skull characters of captive lions to a marked degree. Even the skulls of these enormous lions have less braincase capacity than any wild-killed examples of the East African lion.

Following are some measurements of the capacity of the braincase in fully adult lions:

MALES.

History.	No.	Name.	Locality.	Cc.
Wild-killed	155443	*Felis leo massaica*	Nairobi	265
Do	182297	do	Kapiti	265
Do	182332	do	do	285
Park-reared	[1] 199707	do	Nairobi	215
Do	[1] 197944	do	do	220
Do	38246	"Richardson lion"		250
Do	144054	"Menelik lion"	[Abyssinia]	255

FEMALES.

Wild-killed	182309	*Felis leo massaica*	Ulu	245
Do	182326	do	Kapiti	255
Do	182421	do	do	245
Park-reared	[1] 197137	do	Nairobi	190
Do	[1] 199524	do	do	215

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[1] McMillan lions. These are the only park-reared skulls strictly comparable with wild-killed *F. l. massaica*.

The following notes on some interesting habits of lions, as observed by the Smithsonian African Expedition, are taken from the chapter on this animal in Roosevelt and Heller's Life-Histories of African Game Animals.[1]

The lion is common throughout all the portions of East Africa which we visited except on the high, wet plateaux and in the dense forests; we did not come across it in Uganda; but it was found on the Lado and less commonly along the White Nile to the Sobat. There are geographical varieties; but the presence or absence of the mane, and its color—black, tawny, or mixed—represent individual and not specific or subspecific variation; black and yellow-maned lions come from the same litter, and the fullness of the mane may vary greatly among males from the same litter, although it is apt to be heaviest where the climate is cold.

The litters are certainly born at various times. Judging by the cubs we saw, one litter must have been produced by a lioness on the Kapiti Plains in January, and another on the upper Guaso Nyiro of the north about the first of June; and in each there were in the immediate neighborhood of the litters of comparatively young cubs—three or four months old—other young lions probably three or four months older. This must mean that in East Africa litters may be born at almost any season of the year. The lying-in place of the lioness is sometimes in a cave, sometimes in thick brush or long grass. Normally the cubs remain where they were born for a few weeks, the mother leaving them to hunt, and returning sometimes after an absence of forty-eight hours; but they make no noise even when left thus long. If game is abundant they may keep to the original lair for several months, but if game is scarce, or for other reasons, the lioness may shift her quarters when her young ones are not much bigger than tom-cats, and the family may then be seen travelling long distances until another suitable place for a lair is reached. When the cubs are three months or so old, they habitually travel with the mother; then, instead of eating her fill at a kill and afterward returning to the cubs, the latter run up to the kill and feed at it with their mother. We found flesh and hair in the stomachs of two cubs; for they begin to eat flesh long before they stop suckling. While still very young they try, in clumsy fashion, to kill birds and small animals. By the time they are four or five months old they sometimes endeavor to assist the mother when she has pulled down some game which is not formidable, but has not killed it outright before they come up; and soon afterward they begin to try regularly to help her in killing, and they speedily begin to help her in hunting and to attempt to hunt for themselves. Evidently in their first attempts they claw and bite their prey everywhere; for we found carcasses of zebra and hartebeest thus killed by family parties which were scarred all over.

Lions are sometimes monogamous and sometimes polygamous, and there is much variety in the way they conduct their family life. It is a common thing for an old male to be found alone, and it is no less common for two adult males to be found in company, living and hunting together; the two famous man-eaters of Tsavo, which for a time put a complete stop to the building of the Uganda Railroad, were in the latter category. A lion and a lioness are often found together, and in such case a strong attachment may be shown between them, and the union be apparently permanent; at least this would seem to be the case from the fact that such pairs will often remain together just before the birth of the cubs and while the latter are very little, the lion lying up during the day in the neighborhood of his mate and her litter. But it is a frequent thing to find a party of lions consisting of one old male, of two or three or four females, and of the cubs of some of the latter; and these parties are well known to the Ukamba and 'Ndorobo hunters, and their association is permanent, so that these cases evidently afford instances of polygamy. Two or three lionesses sometimes live in companionship, with perhaps the cubs of one or more of them; and a single lioness may be found either by herself or with the cubs of one litter, or of two litters. On one occasion we found a lioness associating with a young male, not yet quite fully grown but already much bigger than she was, and a couple of young cubs perhaps two or three months old; now, from information given us by the natives, we are inclined to think (although, of course, we are not certain) that the young male was one of her cubs of a former litter, and the father of the cubs that were with them. Finally, it may happen that lions join temporarily in larger parties, which may contain two or three adult males, several females, and young animals of various ages; but we are inclined to believe that these associations are short-lived, being due to peculiar conditions, such as great local abundance of game—for lions often hunt together in order to profit by mutual support. * * *

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[1] Life-Hist. Afr. Game Animals, vol. 1, pp. 164-167, 169. 1914.

Lions do not go into heavy forests, although they make their day lairs along the edges. They like to lie up for the day in patches of jungle which border on open plains; in bushes in open scrub; in clumps of reeds; in any thick bit of cover in the open thorn forests which are so plentiful in much of the game country; and perhaps especially in a strip of cover along a river, or one of the dense masses of brush and trees, of small extent, which are found along the watercourses. They also lie in tall grass. Occasionally they lie, throughout the day, right out in the open, on a mound or the side of an ant-hill, or under a low bush or tree that does not shield them from sight. If the grass is very tall they find it easy to get close to their prey and to evade human observation; and where the brush is thick or the open forest fairly continuous it is almost a chance if one comes on them. If much molested they become strictly nocturnal; otherwise, under more natural conditions, although they spend most of the day sleeping, they may sometimes be seen leisurely strolling in the open, and they often return to their resting-places after sunrise, and leave them before sunset—although even under such circumstances it is only exceptionally that they hunt except under cover of darkness. Once we came on a big male lion in mid-afternoon walking back across the open plain to a zebra he had killed on the previous night; and once, at the same time of day, we came on a lioness leading her cubs back to the carcass of a wildebeest, also slain over night. On another afternoon we came across a lion and lioness gazing intently at an old bull wildebeest which was returning their stare, very much on the alert, at a distance of sixty yards.

For measurements of specimens see tables, pages 166-169.

FELIS LEO NYANZÆ Heller.

1910. *Felis leo massaica* ROOSEVELT, Afr. Game Trails, Amer. ed., p. 476; London ed., p. 487. (Part.)

1913. *Felis leo nyanzæ* HELLER, Smithsonian Misc. Coll., vol. 61, No. 19, p. 4. November 8. (Kampala, Uganda; type in U. S. Nat. Mus.)

1914. *Felis leo nyanzæ* ROOSEVELT AND HELLER, Life Hist. Afr. Game Animals, vol. 1, p. 226.

1917. *Felis leo nyanzæ* HOLLISTER, Proc. U. S. Nat. Mus., vol. 53, p. 183. June 1.

Specimens.—Forty, from the following localities:

UGANDA: Kampala, 1, the type (T. Roosevelt).

BRITISH EAST AFRICA: Kabalolot Hill, Sotik, 6 (Rainey); Lime Springs, Sotik, 5 (Rainey, Johnston); Loita Plains, 9 (Rainey, Heller, Johnston); Njoro Osolali, Sotik, 2 (T. Roosevelt, K. Roosevelt); Southern Guaso Nyiro River, 6 (T. Roosevelt, Loring, Mearns); Telek River, 7 (Rainey, Johnston, Heller).

German East Africa: Western edge Serengeti Plains, near head of the Mbalageti River, 4 skulls (Elton Clark, Lindsay).

The Uganda lion, whose range extends along the shores of Victoria Nyanza and eastward to the Southern Guaso Nyiro River in British East Africa, is a darker, richer colored, and longer haired animal than the lion of the Kapiti Plains and Kilimanjaro regions. The type skin of *nyanzæ* has been considerably darkened by stain, apparently from red soil and also from some native tanning process. This has reddened all the lighter parts on the face, head, and limbs. The skin was presented to Colonel Roosevelt by the European residents at Kampala and has not been re-dressed by museum taxidermists or tanners. The Sotik lion skins are all of the same dark race, and allowing for the undoubted darkening of some of the lighter parts on the type, are almost precisely of the same shade of color.

A maned male of this form, killed by Kermit Roosevelt in the Sotik, weighed 412 pounds. Another large male, also maned, shot by Colonel Roosevelt in the same region, weighed 410 pounds. Both of these animals were thin. All of the adult males of this form in the collection are "yellow-maned," with little trace of black in the longer hairs of the head and neck. The young of *Felis leo nyanzæ* are even more spotted on the underparts, legs, and feet than are the young of *F. l. massaica*. There is the same great variation in size of skull and teeth in the lioness as in *massaica*.

For measurements see tables, pages 166–169.

FELIS LEO SOMALIENSIS Noack.

1891. [*Felis leo*] var. *somaliensis* Noack, Jahrb. Hamburgischen Wiss. Anst., vol. 9, 1st half, p. 120. ("Somaliland.")

Specimen.—One, as follows:

"Somaliland" (Gross).

This race of the lion was described from a pair of animals living in the Berlin Zoological Gardens. The exact history of the specimens is somewhat in doubt, and according to Heller[1] the animals have since been traded to other zoological parks, and all trace of them has been lost. Our specimen is an animal which died in the National Zoological Park in Washington, and it exhibits all the usual characteristics of color and skull found in lions reared in captivity. For this reason it is valueless for systematic purposes.

A lioness from Somaliland now living in the National Zoological Park is distinctly smaller than the average lioness from British East Africa. The subspecies seems to be well marked and it is greatly to be hoped that wild-killed specimens may before long reach the Museum.

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[1] Roosevelt and Heller, Life-Hist. Afr. Game Anim., vol. 1, p. 224. 1914.

FELIS LEO ROOSEVELTI Heller.

Plate 43.

1913. *Felis leo roosevelti* Heller, Smithsonian Misc. Coll., vol. 61, No. 19, p. 2. November 8. ("Highlands of Abyssinia near Addis Ababa;" type in U. S. Nat. Mus.)

1914. *Felis leo roosevelti* Roosevelt and Heller, Life-Hist. Afr. Game Anim., vol. 1, map, p. 227.

1917. *Felis leo roosevelti* Hollister, Proc. U. S. Nat. Mus., vol. 53, pp. 186, 188, 192, June 1.

Specimens.—Four, from localities as follows:

Sudan: Omdurman, 1 (Wingate).

Abyssinia: "Abyssinia," 2 (Menelik, Nat. Zoo. Park); Harrar, 1 (Nat. Zoo. Park).

All of these four specimens are animals which have died in the Zoological Park, and all show the unmistakable characteristics of bone and color usual to lions reared in captivity. They are therefore valueless for systematic work.

The status of this subspecies is greatly in doubt. The type-specimen was presented by King Menelik of Abyssinia to President Roosevelt in 1904 and was deposited in the National Zoological Park in March of that year. It died November 14, 1906. In describing the race, Heller assumed that this animal was captured near Addis Ababa and that it was fully grown when taken by the Abyssinians. Both of these assumptions are apparently groundless, as the skull shows unquestionably that the lion lived his life in captivity from early adolescence. The locality "Addis Ababa" is not entered in the museum records, and there is every chance that the lion was brought to the Emperor as a kitten by some of his subjects living in some far-distant corner of Abyssinia. The skull almost exactly agrees with the old male skulls of the McMillan lions from Nairobi, British East Africa, which died in the National Zoological Park, and can not be separated subspecifically from them. It differs from all the wild-killed skulls of *Felis leo massaica* exactly as these McMillan skulls differ from wild-killed lion skulls from the vicinity of Nairobi.[1] The skin is dark and richly colored and has a splendid mane, but, as stated before, these are characteristics of zoological park lions. All the characters used in separating the race, then, are those common to specimens of *massaica* reared in captivity, and it might be argued that since the type specimen of *roosevelti* might well have originally been captured within the habitat of *massaica* the name should be placed in the synonymy of the latter form. There are few specimens of wild-killed Abyssinian lions in collections, and great effort should be made to obtain such material before it is too late.

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[1] See Hollister, Some Effects of Environment and Habit on Captive Lions, Proc. U. S. Nat. Mus., vol. 53, pp. 177-193. June 1, 1917.

Measurements of skulls of adult lions from East Africa.

Form and locality.	No.	Sex.	Condylobasal length.	Greatest length.	Zygomatic breadth.	Mastoid breadth.	Interorbital constriction.	Rostral breadth over canine.	Lachrymal foramen to alveolar point.	Greatest length nasals.	Mandible.	Front of upper canine to back of pm^4.	Front of lower canine to back of m_1.	Observations.
F. l. massaica.														
British East Africa:														
Mount Kilimanjaro	174742	Male	318	351	241	132	68	94	132	104	241	109	126	Basal suture obliterated.
Kapiti Station	182297	...do	322	373	248	135	71	100	140	110	257	112	128	Do.
Do	182332	...do	328	372	228	138	70	93	139	112	253	112	128	Basal suture open.
Ulu Station	182307	...do	324	....	230	142	71	91	139	111	249	113	128	Do.
Ulukenia Hills	182313	...do	....	....	236	....	72	95	135	101	244	110	127	Do.
Nairobi	155443	...do	335	373	234	135	70	92	146	118	256	116	133	Basal sature obliterated.
Laikipia Plat	163328	...do	316	337	233	133	75	92	139	107	235	112	127	Do.
Nairobi [1]	197944	...do	309	345	261	146	78	96	136	97	248	108	127	Do.
Do	199707	...do	325	363	264	152	80	104	139	101	260	113	131	Do.
F. l. nyanzæ.														
British East Africa:														
Lime Springs, Sotik	181568	Male	295	334	216	131	67	93	127	102	233	104	120	Basal sature open.
Do	181569	...do	318	345	211	124	68	94	132	96	238	106	118	Do.
Do	181570	...do	....	....	229	137	68	92	133	98	244	105	122	
Do	181571	...do	324	368	243	135	71	98	137	114	255	108	125	Basal suture closed.
Kabalolot Hill	181573	...do	....	....	221	....	65	91	126	101	241	107	123	
Do	181574	...do	322	352	226	131	67	91	138	103	244	106	118	Basal suture open.
Telek River	181577	...do	318	356	235	132	70	93	132	103	245	109	125	Basal suture closed.
So. Guaso Nyiro Riv	162913	...do	329	371	251	144	74	98	136	106	255	114	132	Do.
Njoro Osolali	162919	...do	321	356	235	132	66	92	133	104	242	111	128	Basal suture obliterated.
F. l. roosevelti.														
Abyssinia:														
"Adis Ababa" [1]	[2] 144054	Male	295	333	255	132	69	94	129	95	287	105	124	Basal suture obliterated.
Harrar [1]	174639	...do	308	333	246	127	70	89	131	98	234	104	118	Do.

F. l. massaica.														
British East Africa:														
Mount Kilimanjaro........	174744	Female..	270	301	195	116	60	79	111	88	207	94	108	Basal suture obliterated.
Ulu Station............	182308	...do.....	259	290	195	115	58	80	111	90	202	93	110	Do.
Do..................	182309	...do.....	280	306	195	122	56	85	115	89	210	98	115	Basal suture open.
Do..................	182311	...do.....	262	285	195	114	57	77	110	88	204	91	107	Do.
Kapiti Station..........	182293	...do.....	264	294	203	120	63	81	111	86	203	96	108	Basal suture obliterated.
Do..................	182324	...do.....	266	299	185	111	57	78	115	90	200	94	108	Do.
Do..................	182326	...do.....	267	299	204	117	60	80	113	91	210	95	108	Do.
Do..................	182421	...do.....	262	292	192	119	58	76	110	88	203	93	106	Do.
Do..................	182423	...do.....	254	282	180	112	54	74	106	80	198	91	105	Do.
Wami Hill..............	161914	...do.....	258	291	192	114	58	77	108	86	196	91	104	Do.
Kitanga................	182315	...do.....	....	....	....	....	58	80	110	90	197	93	106	
Laikipia Plat...........	163109	...do.....	269	295	195	112	67	81	116	97	212	98	115	Do.
Do..................	163329	...do.....	273	307	193	115	60	81	121	100	209	99	115	Do.
N. Guaso Nyiro Riv........	163108	...do.....	264	298	195	112	64	81	117	93	200	98	112	Do.
Nairobi[1]...............	197137	...do.....	265	291	209	120	59	81	115	89	200	93	105	Do.
Do..................	199524	...do.....	265	300	224	119	64	84	112	87	206	92	104	Do.
F. l. nyanzæ.														
British East Africa:														
Loita Plains............	181589	Female .	269	296	202	117	62	80	117	87	208	95	109	Basal suture obliterated.
Do..................	181590	...do.....	253	280	185	107	57	73	106	82	195	91	106	Basal suture closed.
Do..................	181592	...do.....	273	306	205	112	64	81	118	94	210	100	114	Basal suture obliterated.
Kabalolot Hill...........	181572	...do.....	266	291	187	109	62	81	115	92	207	98	111	Do.
Do..................	181930	...do.....	264	300	206	115	61	84	114	92	206	99	111	Do.
Telek River............	181578	...do.....	256	284	180	105	58	75	109	85	196	94	107	Do.
Do..................	181583	...do.....	278	309	202	117	63	86	117	98	211	99	115	Do.
Njoro Osolali............	162916	...do.....	281	313	204	123	66	88	121	93	212	102	113	Do.
So. Guaso Nyiro Riv.......	162914	...do.....	254	277	185	113	56	75	99	79	199	94	114	Do.
Do..................	162915	...do.....	268	299	203	118	54	84	110	89	205	95	110	Do.
Do..................	162917	...do.....	272	302	196	115	60	80	111	89	208	98	111	Do.
Do..................	162918	...do.....	261	285	198	113	55	89	107	87	203	94	106	Do.
F. l. somaliensis.														
Somaliland[1]...............	153525	Female .	....	289	213	111	60	81	115	82	202	90	106	Basal suture obliterated.

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[1] Reared in captivity.

[2] Type.

External and dental measurements of adult lions from East Africa.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Ear.	Alveolar length of upper canine.	Upper carnassial.	Second upper premolar.	Lower molar.
F. l. massaica.										
British East Africa:										
Mount Kilimanjaro	174742	Male					26.2	35.4×16.4	25.2×13.0	25.6×13.3
Kapiti Station	182297	do					27.8	40.0×19.9	27.5×13.5	28.6×15.3
Do	182332	do					26.5	37.8×19.2	27.2×13.7	28.7×14.5
Ulu Station	182307	do					24.5	37.8×18.8	26.7×13.9	28.5×14.2
Ulukenia Hills	182313	do					26.9	41.5×21.1	28.5×15.4	28.9×15.3
Nairobi	155443	do					27.8	39.3×18.9	27.3×14.0	28.8×14.5
Laikipia Plat	163328	do					24.4	38.0×19.1	27.3×12.1	27.7×13.6
Nairobi [1]	197944	do					23.0	35.8×18.1	24.0×13.4	28.2×13.9
Do	199707	do					25.2	37.9×19.7	25.8×13.0	27.6×14.7
F. l. nyanzæ.										
British East Africa:										
Lime Springs, Sotik	181568	Male	1630		315	130	27.3	37.7×19.3	25.3×12.5	28.8×14.8
Do	181569	do	1760	980	355	133	26.8	36.6×16.3	24.2×12.0	27.7×13.9
Do	181570	do	1730		355	140	27.4	38.1×17.2	25.8×12.3	29.8×14.5
Do	181571	do		980	375	132	27.9	40.8×19.5	26.2×12.9	30.6×15.2
Kabalolot Hill	181573	do	1720	1010	370	120	26.3	38.5×17.9	24.9×12.0	28.7×14.2
Do	181574	do		930	340	128	24.3	35.3×17.4	24.5×12.9	24.9×12.8
Telek River	181577	do	1835	914	375	145	26.1	37.3×18.8	25.4×12.2	28.8×14.0
South Guaso Nyiro River	162913	do	1950	1030	385	145	26.7	37.9×19.4	25.1×13.8	28.2×15.2
Njoro Osolali	162919	do		930	365		27.5	39.7×18.5	24.6×13.2	30.6×14.8
F. l. roosevelti.										
Abyssinia:										
"Adis Ababa" [1]	[2] 144054	Male	[3] 1780	760	350		23.1	34.3×17.3	24.7×11.8	25.6×12.4
Harrar [1]	174639	do					24.9	34.8×21.9	23.7×12.5	25.0×12.5

F. l. massaica.										
British East Africa:										
Mount Kilimanjaro	174744	Female	....	....	....	....	21.8	34.0×10.2	23.7×11.5	24.2×12.3
Ulu Station	182308	do	....	....	....	....	23.6	35.4×17.7	23.8×11.7	25.1×12.7
Do	182309	do	....	....	....	....	24.9	38.5×19.4	27.7×14.1	28.4×14.6
Do	182311	do	....	....	....	....	20.7	33.6×15.9	22.3×11.5	24.6×13.2
Kapiti Station	182293	do	....	....	....	....	21.9	35.2×17.1	23.7×12.9	25.3×13.9
Do	182324	do	....	....	....	....	20.9	33.9×16.8	23.6×11.7	25.3×12.4
Do	182326	do	....	....	....	....	19.4	33.2×15.5	22.1×11.2	23.9×12.1
Do	182421	do	....	....	....	....	21.9	32.5×16.3	23.1×12.2	23.3×12.7
Do	182423	do	....	....	....	....	21.2	33.1×17.0	21.8×12.5	24.6×13.6
Wami Hill	161914	do	1560	820	325	127	21.7	33.4×15.6	21.7×11.1	24.2×12.1
Kitanga	182315	do	....	....	....	....	23.2	35.6×16.5	22.2×12.0	25.6×13.2
Laikipia Plat	163109	do	....	....	....	....	23.5	33.2×17.5	24.2×12.8	25.1×13.2
Do	163329	do	....	....	....	....	21.2	33.9×17.4	22.9×12.1	25.9×12.9
North Guaso Nyiro River	163108	do	....	....	....	....	22.8	35.0×17.3	25.7×13.2	25.6×12.9
Nairobi[1]	197137	do	1410	724	305	....	19.1	33.6×15.2	22.9×10.5	23.8×11.9
Do	190524	do	1621	801	336	....	19.2	32.5×15.4	21.7×11.3	22.9×12.4
F. l. nyanzæ.										
British East Africa:										
Loita Plains	181589	Female	1470	910	310	120	21.3	33.0×15.3	21.9×11.7	25.0×12.5
Do	181590	do	1520	840	315	110	20.2	31.8×14.7	20.6× 9.6	23.6×11.5
Do	181592	do	1590	960	360	115	22.8	34.7×18.0	22.6×10.8	24.4×13.7
Kabalolot Hill	181572	do	....	900	370	118	22.5	35.3×16.4	24.1×12.1	25.5×13.7
Do	181930	do	....	....	....	....	23.3	34.4×16.4	23.3×11.8	25.1×12.9
Telek River	181578	do	1490	920	335	122	21.3	34.5×16.4	22.1×11.8	25.2×13.0
Do	181583	do	1575	976	325	120	22.8	32.8×15.8	23.4×11.7	25.2×12.9
Njoro Osolali	162916	do	....	820	340	128	22.8	36.2×17.8	24.2×11.7	25.5×13.8
South Guaso Nyiro River	162914	do	....	875	330	110	19.6	....	22.9×10.7	22.7×11.2
Do	162915	do	....	840	330	116	23.0	34.4×17.9	22.9×13.3	25.7×13.6
Do	162917	do	....	....	....	....	20.4	33.0×16.5	23.3×11.7	23.4×12.2
Do	162918	do	....	....	....	....	21.2	35.7×17.1	23.1×10.7	24.9×12.3
F. l. somaliensis.										
Somaliland[1]	153525	Female	....	....	....	....	20.5	30.8×16.3	21.0×11.1	24.1×12.3

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[1] Reared in captivity.

[2] Type of *Felis leo roosevelti* Heller.

[3] From tanned skin.

FELIS PARDUS PARDUS Linnæus.

1758. *Felis pardus* LINNÆUS, Syst. Nat., ed. 10, p. 41. (Valley of the Nile, Egypt.[1])

Specimens.—Two skins, without skulls, from the following localities:

SUDAN: El Dueim, 1 (Mearns); Khartoum, 1 (Mearns).

These skins indicate that true *pardus* is a much more ochraceous-buff colored animal than are the upper Nile or East African forms of the leopard. No skulls of typical *pardus* are in the collection, and comparison of the specimens is therefore very unsatisfactory. The Khartoum skin is that of an immature animal; the El Dueim specimen an adult male.

For measurements of specimens of leopards see tables, pages 172–173.

FELIS PARDUS CHUI Heller.

Plates 44, 45.

1913. *Felis pardus chui* HELLER, Smithsonian Misc. Coll., vol. 61, No. 19, p. 6. November 8. (Gondokoro, Uganda; type in U. S. Nat. Mus.)

1914. *Felis pardus chui* ROOSEVELT AND HELLER, Life-Hist. African Game Anim., vol. 1, p. 239.

Specimens.—Three, as follows:

LADO: Rhino Camp, 1 (Heller).

UGANDA: Gondokoro, 7 miles east of, 1 (Heller).

BITISH EAST AFRICA: Nzoia River, Guas Ngishu Plateau 1 (K. Roosevelt).

The specimen listed above from the Nzoia River is not typical of *Felis pardus chui* but seems to belong with this form rather than with *suahelica* of the region to the east. It is a rather young adult female which shows characters intermediate between the two forms. In size it is considerably larger than any adult female of *suahelica*, and has a larger skull. The body color and spotting are more like *suahelica* than like *chui*, but the feet have the white ground color of *chui* rather than the yellowish-buff of *suahelica*. The region is just where specimens intermediate between the two forms might be expected to occur, although *suahelica* is found in the Elgoyo forest only a short distance to the east. Adult male leopards from the Nyanza region are greatly desired to work out the interrelations of the two forms. As noted under *Felis pardus suahelica*, specimens of that form from the Naivasha Lake country are larger than those from farther east, and are approaching in that character, but without change in color, the form from the Upper Nile.

The old male from Rhino Camp, Lado, measured 725 millimeters high at shoulder; the female from Guas Ngishu Plateau, 670.

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[1] Cabrera, Bol. Real. Soc. española Hist. Nat., 1910, p. 425, November; Thomas, Proc. Zool. Soc. London, 1911, p. 135, March.

FELIS PARDUS SUAHELICA Neumann.

Plate 5.

1900. *Felis leopardus suahelicus* NEUMANN, Zool. Jahrb., Syst., vol. 13, p. 551. ("East Africa"; specimens mentioned from Tanga, Manyara Lake, Nai, and Usandawe, German East Africa, and from Loita Hills, British East Africa; and "Uganda." Type locality may be restricted to some point in northeastern German East Africa; cotypes [?] in Berlin Museum.)

1910. *Felis pardus suahelica* ROOSEVELT, African Game Trails, Amer. ed., p. 476; London ed., p. 487.

1914. *Felis pardus suahelica* ROOSEVELT AND HELLER, Life-Hist. African Game Anim., vol. 1, p. 236.

1914. *Felis pardus ruwenzorii* ROOSEVELT AND HELLER, Life-Hist. African Game Anim., vol. 1, p. 238. (Part, specimen from Meru; not of Camerano.)

Specimens.—Twenty-four, from the following localities:

SOMALILAND: "Somaliland," 2 (Cunningham).

ABYSSINIA: Adis Ababa, 1 skin (Philip).

BRITISH EAST AFRICA: Juja Farm, 1 (K. Roosevelt); Kabalolot Hill, Sotik, 1 (Heller); Kamiti Farm, Athi Plains, 2 (Mearns); Kampi Moto, 20 miles north of Nakuru, 1 (K. Roosevelt); Kapiti Station, 1 (Rainey); Kisii District, 4 odd skulls (Loring); Lake Naivasha, 2 (Heller, Mearns); Meru, 1 (Heller); Rumathe River, Northern Guaso Nyiro, 1 (Heller); Ulu Station, 6 (Rainey, Heller); Voi, 1 skin (Heller).

The two specimens from "Somaliland" died in the National Zoological Park in Washington; the skull of the adult male shows all the characteristic features of a zoo-reared cat, as described under *Felis leo massaica*. These specimens are of little use for systematic purposes; the exact point of capture is unknown. They do not vary enough from ordinary skins of *Felis pardus sauhelica* in size or markings to excite suspicion that they might represent a distinct race, and the skull of the male is fully as large as in *suahelica*. It is quite evident that these specimens do not represent the *Felis pardus nanopardus* of Thomas,[1] described from forty miles west of Gorahai. The skin from Adis Ababa, Abyssinia, is a fine example of the "black" leopard. The markings are plainly traceable, however, and from the size of the spots the form represented is not the *Felis pardus pardus* which occurs at Khartoum, but rather *F. p. suahelica*. Unfortunately, the specimen is without a skull.

The series of skins and skulls from various parts of British East Africa, except for a few individual specimens, is a very uniform lot in color and size. The two skulls and one skin from Naivasha are somewhat larger than others in the series from southern and central British East Africa and are approaching in this character *Felis pardus chui* of the Upper Nile Valley. In color the skin is typical of *suahelica* and shows no indication of gradation toward *chui*, as does the

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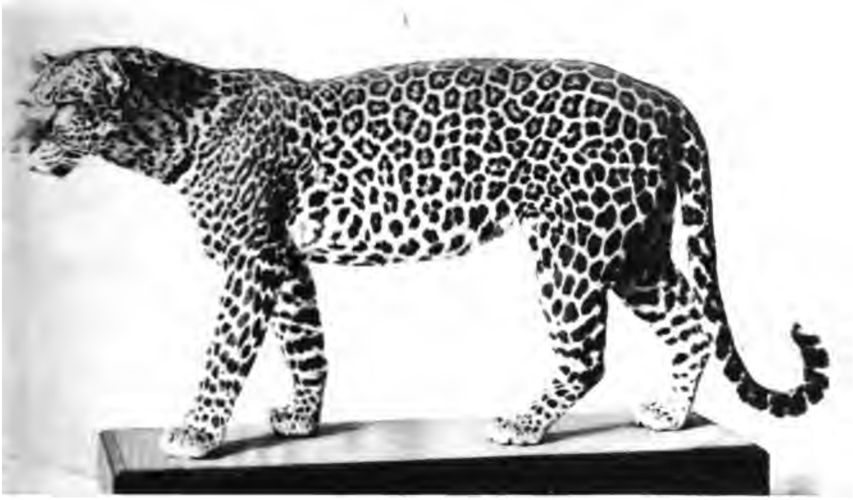
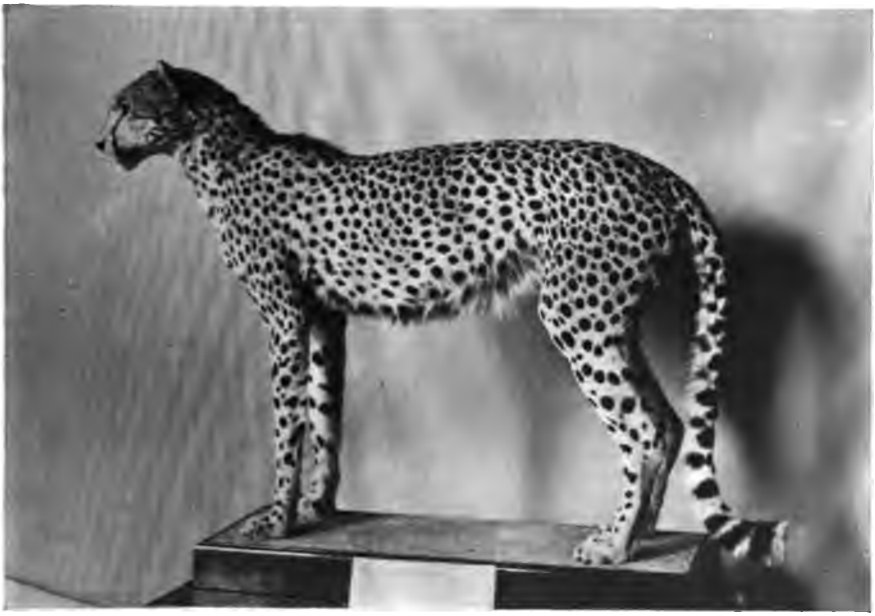
[1] Ann. and Mag. Nat. Hist., ser. 7, vol. 14, p. 94. July, 1904.

Measurements of skulls of leopards from East Africa.

Form and locality.	No.	Sex.	Greatest length.	Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Interorbital constriction.	Rostral breadth over canine.	Lachrymal foramen to alveolar point.	Greatest length nasals.	Mandible.	Front of upper canine to back of pm^4.	Front of lower canine to back of m_1.	Observations.
Felis p. chui.														
Uganda: Gondokoro	[1] 164764	Male	243	226	150	94	37	59	84	76	166	76	88	Basal suture obliterated.
Lado: Rhino Camp	164763	...do	247	221	153	97	42	59	85	71	165	76	90	Do.
B. E. A.: Nzoia River	163093	Female	213	194	129	84	35	50	71	60	139	67	78	Basal suture open.
Felis p. suahelica.														
B. E. A.:														
Ulu	182329	Male	224	202	137	92	38	54	77	67	146	72	82	Do.
Kapiti	182323	...do	225	205	144	88	41	58	74	66	147	71	83	Basal suture obliterated.
Kabalolot Hill	181595	...do	220	200	138	90	35	55	75	60	148	71	81	Basal suture closed.
Kisii	162147	...do	212	192	138	86	36	52	70	63	140	70	79	Basal suture open.
Meru	163095	...do	220	202	140	90	37	50	73	66	149	72	81	Basal suture obliterated.
Rumathe River	182178	...do	218	201	139	85	41	57	74	62	143	67	78	Do.
Naivasha	162926	...do	234	209	138	92	39	57	78	70	154	74	86	Basal suture open.
Do	162927	...do	238	217	150	95	43	58	82	74	156	74	85	Basal suture obliterated.
Ulu	184818	Female	189	175	124	75	33	45	61	56	125	61	71	Do.
Do	184819	...do	182	167	110	72	32	44	62	54	120	59	69	Do.
Juja Farm	161911	...do	185	170	114	73	31	46	61	54	120	60	68	Do.
Kisii	162144	...do	190	177	120	77	33	47	61	55	124	59	69	Basal suture open.
Do	162145	...do	198	180	125	76	34	47	64	59	131	63	70	Basal suture obliterated.
Do	162146	...do	197	179	125	78	33	48	64	61	127	62	71	Do.
Kampi Moto	163094	...do	192	176	126	79	34	50	65	60	131	63	72	Do.
F. fortis.														
B. E. A.: Loita Plains	[1] 181600	Male	260	236	157	104	43	64	85	76	173	81	90	Do.

[1] Type specimen.





UPPER FIGURE, EAST AFRICAN LEOPARD; LOWER FIGURE, RAINEY'S CHEETAH.

FOR EXPLANATION OF PLATE SEE PAGE 181.

External and dental measurements of adult leopards from East Africa.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Ear.	Alveolar length of upper canine.	Upper carnassial.	Second upper premolar.	Lower molar.
Felis p. chui.										
Uganda: Gondokoro	[1] 164764	Male	1240	840	255	90	16.1	24.0×13.5	17.8× 8.9	18.7× 9.2
Lado: Rhino Camp	164763	do.	1180	755	260	76	17.1	26.2×12.8	18.2× 9.0	20.3× 9.6
B. E. A.: Nzoia River	163093	Female	1220	840	230	75	13.7	23.3×12.2	15.8× 7.8	17.7× 8.1
Felis p. suahelica.										
B. E. A.:										
Ulu	182329	Male					14.8	24.6×12.6	17.6× 8.4	17.8× 8.5
Kapiti	182323	do.					16.1	24.7×12.9	17.0× 8.6	18.0× 9.3
Kabalolot Hill	181595	do.	1250	910	240	80	16.2	24.7×12.5	17.2× 8.5	17.7× 9.0
Kisii	162147	do.					16.8	26.2×14.2	17.1× 7.4	18.5× 8.7
Meru	163095	do.	1270	830	250	83	17.3		18.2× 9.0	20.4× 9.3
Rumathe River	182178	do.	1180	830	235	75	17.2	25.2×13.2	16.8× 8.7	19.5× 9.1
Naivasha	162926	do.	1270	890	265	85	17.0	24.8×13.3	17.3× 8.1	18.1× 9.4
Do.	162927	do.					16.8	26.0×13.6	16.8× 8.2	21.0×10.2
Ulu	184818	Female					12.3	21.5×11.1	14.5× 7.3	16.8× 8.2
Do.	184819	do.					11.8	22.3×10.5	14.7× 7.1	16.6× 7.7
Juja Farm	161911	do.	1000	730	220	68	13.8	22.2×11.4	15.0× 7.3	15.7× 7.2
Kisii	162144	do.					13.1	21.8×11.8	14.5× 7.1	15.9× 7.8
Do.	162145	do.					13.0	22.8×11.4	15.5× 6.6	15.8× 7.7
Do.	162146	do.					13.2	24.3×12.7	15.5× 8.2	17.2× 8.2
Kampi Moto	163094	do.					14.0	22.9×12.0	15.0× 7.7	16.3× 8.6
F. fortis.										
B. E. A.: Loita Plains	[1] 181600	Male					18.7	26.8×15.4	19.1×11.0	19.2× 9.4

[1] Type-specimen.

Nzoia River skin listed under the latter form. The Meru specimen, which has been referred by Roosevelt and Heller to the Ruwenzori form,[1] is peculiar in color. It is a fine, large leopard, with large spots and of a dark general coloration. The skin has been mounted, which makes satisfactory comparison with tanned skins difficult; but the skull differs in no essential detail from the general type found in *suahelica.* It seems best, until more plentiful material from the region is at hand, to consider this animal a slightly peculiar individual of *suahelica,* rather than to admit the existence of a subspecies based on such a limited number of specimens with a disconnected distribution in the forested parts of Ruwenzori and Kenia. The Meru specimen, an old male, was captured in a trap. He was a "man-eater," and had only a short time before killed and eaten a native woman. His teeth were in bad condition, the upper carnassial virtually useless.

Young of several ages are represented in the series. The very young are quite reddish in color above, but this condition rapidly changes to the common buff ground color with brownish and blackish markings of the nearly grown though immature animal. The following weights of adult male leopards are recorded in the collector's field books: Ulu Station, 112 pounds; Lake Naivasha, 126 pounds; Meru, 100 pounds. The female from Juja Farm weighed under 70 pounds (54 pounds dressed).

The name *suahelica,* as here applied to the common East African leopard, barely escapes classification as a *nomen nudum.* Neither type-specimen nor definite type-locality were designated by Neumann, in describing, or rather naming, the race. "Reference to his [Neumann's] specimens now in the Berlin Museum shows none marked as the type, so that an exact idea of what he had in mind can not now be ascertained. Neumann labored under the supposition that two species occurred throughout East Africa, a large-spotted and a small-spotted form, the former of which he attempted to describe as *suahelica.* No substantial difference in the size of the spots in adults from the region can be detected. There is, however, a marked difference in spotting in the immature and the adults, the former being fine spotted, owing to the rosettes being broken up into several solid spots, which later coalesce to form the rosettes of the adult. Neumann's skins were chiefly flat specimens obtained from natives and were without skulls, so that their relative ages were unknown, and the error of associating the difference in size of spots with racial rather than age characters was doubtless made. Old males often show the larger and more completely ocellated spots" (Roosevelt and Heller, Life-Histories African Game Animals, vol. 1, page 237).

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[1] Life-Hist. African Game Animals, vol. 1, p. 239. 1914.

The specimen from Kabalolot Hill is mentioned in Heller's journal of the Rainey Expedition as follows:

> Found a tree in which a leopard had hung up a fresh kill of a topi. This tree was one of the prickly pear fruited trees, with many twisted trunks at its base, so that it was not difficult for the leopard to get a good foothold in climbing it. The topi was an adult one and placed about 10 feet above the ground. I set five traps at the base of the tree and caught the leopard during the night.

FELIS FORTIS Heller.

Plates 46, 47.

1913. *Felis pardus fortis* HELLER, Smithsonian Misc. Coll., vol. 61, No. 19, p. 5. November 8. (Aggate's Ranch, Loita Plains, British East Africa; type in U. S. Nat. Mus.)

1914. *Felis pardus fortis* ROOSEVELT and HELLER, Life-Hist. African Game Anim., vol. 1, p. 241.

Specimen.—One, the type, from—

BRITISH EAST BRITISH: Loita Plains (Rainey).

The unique type-specimen of this leopard was killed by a rancher in the Loita Plains bush country bordering his farm and was purchased from him for the United States National Museum by Paul J. Rainey May 31, 1911. In size, color, skull, and dental characters this specimen differs widely from all other leopards in the collection. A case of very exceptional individual variation is here represented or else the animal belongs to a species quite distinct from the common leopard which is found in all the surrounding country.

The absence of the small upper premolar as described in the original diagnosis is, of course, of no importance as a racial character. As a matter of fact this tooth is present on both sides, can be observed without a glass, and under slight magnification can be seen to have incompletely erupted. The second upper premolar (pm^3) is especially peculiar; but the loss, apparently in early life, of the last lower premolar, leaving the upper tooth virtually functionless, makes any speculation on the differences as based on this single example of no real value.

FELIS CAPENSIS HINDEI Wroughton.

1910. *Felis capensis hindei* WROUGHTON, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 205. February. (Machakos, British East Africa; type in British Museum.)

1910. *Felis capensis hindei* ROOSEVELT, African Game Trails, Amer. ed., p. 476; London ed., p. 487.

Specimens.—Eight, from localities as follows:

LADO: Rhino Camp, 1 skull (Mearns).

UGANDA: Gondokoro, 1 (Heller).

BRITISH EAST AFRICA: Kakumega, 1 (Heller); Meru Road. Laikipia, 1 (K. Roosevelt); Mount Kenia Forest Station, 1 skull (Mearns); Naivasha, 1 skull (Loring); Suswa Plain, Sotik, 1 (Heller): Telek River, Sotik, 1 (Heller).

There is considerable variation in tone of ground color and in the pattern of markings within this small series and it is quite evident that a large number of specimens of the East African serval must be assembled before satisfactory results in the distinguishing of subspecies can be assured. The characters used by Wroughton to separate *hindei* from *Felis capensis kempi*,[1] described from Kirui, Mount Elgon, at 6,000 feet,[2] are apparently not of much use in distinguishing forms. Adult male skulls of *hindei* in our collection are as large as the dimensions given for *kempi*, and it is plain that no great difference in size between these two forms exists. I have seen no specimens from Elgon; but can not distinguish our Kakumega specimen, a young adult female, from other East African skins and skulls of *hindei* by any differences of subspecific value.

The Gondokoro skin is slightly more cinnamon colored above than are any of the British East African skins, and the spots and stripes are more broken than usual; but, bearing in mind the great variation known to exist in mammals marked as are the servals, it seems very unwise to recognize a new form based on color alone without a sufficient series of specimens to prove the constancy of the variation. The skin from Meru Road has been mounted and therefore is not comparable with tanned skins; the general appearance and size of markings is much changed by the necessary stretching from the shrunken state usual to tanned skins.

Two specimens from Beira, Portuguese East Africa, and one from Concession Hill, Mashonaland, in the collection, indicate that the form described by Wroughton from Beira, *Felis capensis beiræ*, is a recognizable subspecies. The color differences are slight but the teeth average larger and stouter. The general size of the animal is not much, if any, greater than that of *F. c. hindei*.

The stomach of the Kakumega specimen is recorded by Heller to have contained small rodents—1 *Dendromus* and 3 *Leggada*.

For the use of the specific name *capensis* Forster, 1781, in place of *serval* Erxleben, 1776, see a paper in 1910 by Wroughton.[3]

For measurements of specimens see table, page 177.

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 206. February, 1910.

[2] "Kiru Villages are 6 miles below caves on the south slope of Elgon."—E. Heller, MSS.

[3] Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 205, 1910.

Measurements of servals from East Africa.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Rostral breadth over canine.	Mandible.	Front of upper canine to back of pm^4.	Length of upper carnassial.	Front of lower canine to back of m_1.	Observations.
F. c. hindei.														
Uganda: Gondokoro	164755	Female	710	270	169	106	79	45	30	77	34.0	13.0	37.8	Basal suture closed.
Lado: Rhino Camp	164842	[Male]				111	82	47	32	81	36.8	14.7	40.7	Do.
B. E. A.:														
Kakumega	182383	Female	685	270	163	101	72	46	27	72	33.1	12.7	37.5	Basal suture open.
Meru Road	163092	do				109	77	47	28	78	33.7	12.7	38.5	Basal suture closed.
Mount Kenia	163292	Male				116	84		31	83	37.2	13.7	41.7	Basal suture open.
Naivasha	162142								28		36.7	14.5	40.3	
Telek River	181593	Male	780	335	175	115	83	50	31	83	38.0	14.3	42.6	Basal suture closed.
Suswa Plain	181594	do	860	330	190	115	84	51	32	83	37.7	14.4	42.2	Do.
F. c. beiræ.														
Portuguese E. A.: Beira	61755					107	79		29	79	35.9	13.5	40.6	Basal suture closed.
Do	61754	Female				110	83	48	31	79	37.9	15.0	42.0	Basal suture open.
Mashonaland: Concession Hill.	21645	Male	610	292		114	76	49	30	81	40.2	15.0	44.0	Do.

FELIS OCREATA NANDÆ Heller.

Plates 48, 49.

1913. *Felis ocreata nandæ* HELLER, Smithsonian Misc. Coll., vol. 61, No. 13, p. 14. September 16. (Headwaters of the Lukosa River, Nandi Escarpment, British East Africa, 7,000 feet; type in U. S. Nat. Mus.)

Specimens.—Four, from localities as follows:

BRITISH EAST AFRICA: Kakumega, 3 (Heller); Lukosa River, 1 (Heller).

I have seen no specimens of *Felis ocreata ugandæ* Schwann,[1] described from Mulema, Uganda, but judging from the description this race must be very much like it. Mr. Heller has compared our material with the type and two additional specimens of *ugandæ* in the British Museum, however, and states that *nandæ* is darker in color. One adult specimen from the Kakumega lot is very much lighter than the type of *nandæ*, and only slightly darker than certain specimens of *Felis ocreata taitæ*. This conspicuous variation makes it highly desirable that larger series of these cats be brought together that the ranges of individual variation and of geographical variation may be studied intelligently.

The stomach of the type-specimen contained a specimen of *Rattus medicatus*.

FELIS OCREATA TAITÆ Heller.

Plates 50, 51.

1913. *Felis ocreata taitæ* HELLER, Smithsonian Misc. Coll., vol. 61, No. 13, p. 14. September 16. (Voi, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Four, as follows:

BRITISH EAST AFRICA: Isiola River, 1 (Heller); Juja Farm, 1 (Mearns); Ulukenia Hills, 1 (Loring); Voi, 1 (Heller).

The stomach of the Isiola River specimen contained remains of a *Tatera;* that of the Voi specimen an *Acomys*. The Juja Farm specimen was shot by Mr. McMillan and presented by him to Doctor Mearns. In color it is white, buff, and bright ochraceous-orange. The pattern is almost precisely that of a wild cat. This specimen may possibly be a mixed wild and domestic cat; but, from all the characters, it seems more probable that it is a partially albino wild cat. The tail rings are distinct and not connected above.

For measurements of cats of the *ocreata* group see table, page 179.

FELIS TORQUATA Cuvier.

1827. *Felis torquata* TEMMINCK, Mon. Mamm., vol. 1, p. 255. (Based on Geoffroy and Cuvier, Hist. Mamm., pl. 126—"Chat du Nepaul.")

1907. *Felis torquata* POCOCK, Proc. Zool. Soc. London, 1907, p. 151; pl. 9. (Name revived for the "striped" domestic cat.)

Specimens.—Two, as follows:

BRITISH EAST AFRICA: Changamwe, 1 skull (Mearns); Nairobi, 1 (Mearns).

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[1] Ann. and Mag. Nat. Hist., ser. 7, vol. 13, p. 424. June, 1904.

Measurements of specimens of the Felis ocreata group from British East Africa.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Mandible.	Front of upper canine to back of pm^4.	Length of upper carnassial.	Front of lower canine to back of m_1.	Length of lower molar.	Observations.
F. o. nandæ.														
Lukosa River	[1] 182367	Male	530	410	140	94	69	43.4	67	32.0	10.5	36.2	8.8	Basal suture open.
Kakumega	182389	..do.	520	335	135	91	71	42.7	64	29.7	11.0	33.9	8.9	Basal suture closed.
Do	182390	Female	475	380	122	82	62	41.0	58	28.0	11.0	30.6	8.1	Basal suture open.
F. o. taitæ.														
Isiola River	182022	Female	500	340	125	82	59	38.2	57	28.5	10.7	31.5	8.0	
Voi	[1] 182220	..do.	495	310	118	80	63	40.0	59	26.7	10.6	30.8	8.6	Basal suture closed.
Juja Farm	162020	Male	525	290	135	......	......	......	......	......	......	......	......	
F. torquata.														
Nairobi	162143	Male	550	270	125	......	......	......	63	28.8	11.0	33.0	8.3	

[1] Type.

The specimen from Nairobi was shot by Doctor Mearns in the woods near town. Its markings are almost exactly those of wild cats, except that the black areas are more sharply drawn and the tail has the dark rings connected along the upper side by a continuous stripe. The ground color is clear gray, without brown tones. This specimen may possibly be a mixture of wild stock and domestic stock, but the pattern and color are almost exactly those of feral domestic cats in various tropical countries, and the skull and teeth show the slight peculiarities of the domestic cat as opposed to the wild. In Doctor Lönnberg's account of the mammals collected by the Swedish Zoological Expedition to British East Africa in 1911,[1] he says: "Mrs. McMillan told me that the wild cats interbred with the domesticated cats at Juja Farm."

Among the feral domestic cats in the museum collection is a skin from Cuba which is almost indistinguishable from certain skins of African wild cats, especially the type skin of *Felis ocreata nandæ*

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[1] Kungl. Svenska Vet. Akad. Handl., vol. 48, No. 5, p. 82. 1912.

Heller, except that in the Cuban specimen the blackish tail rings are connected along the upper side.

Genus LYNX Kerr.

1792. *Lynx* KERR, Anim. Kingd., Syst. Cat., No. 288, p. 155. (*L. lynx.*)
1843. *Caracal* GRAY, List Spec. Mamm. Brit. Mus., p. 46. (*L. caracal.*)
1858. *Urolynchus* SEVERTZOW, Rev. Mag. Zool., Paris, ser. 2, vol. 10, p. 389. September. (*L. caracal.*)

The United States National Museum collection contains no specimens of the caracal in addition to those listed below, except of the Arabian and Cape of Good Hope forms. Actual comparison with specimens of true *nubicus* is therefore impossible, but authors generally have of late referred the East African caracal to the *nubicus* of Fitzinger, which is long antedated by *Felis caracal nubicus* Fischer.

LYNX CARACAL NUBICUS (Fischer).

1829. *F*[*elis*] *caracal* γ *nubicus* FISCHER, Synopsis Mamm., p. 210. (Nubia.)

Specimens.—Four, as follows:

BRITISH EAST AFRICA: Nairobi, 1 (Klein); Ulu Station, 3 (Rainey.)

Two adult specimens from Ulu Station, each with the basal suture of the skull obliterated, measure as follows:

	182310♂	182317♀
	mm.	*mm.*
Head and body	800	795
Tail vertebræ	300	260
Hind foot	190	177
Ear	80	75
Skull:		
Condylobasal length	120	111
Zygomatic breadth	87	84
Mastoid breadth	55	52
Interorbital breadth	24	23
Breadth of rostrum over canine	31	29
Length of mandible	88	80
Front of upper canine to back of pm^4	40.4	36.4
Length of upper carnassial	16.0	15.2
Front of lower canine to back of m_1	44.8	40.1
Length of lower molar	12.1	11.2

EXPLANATION OF PLATES.

The smaller skulls were photographed one and one-half times natural size and reduced one-third in the half-tone, while the medium-sized specimens were taken natural size. The scale as given is in most cases correct, but allowance should be made for very slight variations from the size of the actual specimens which sometimes exist in plates made by the photographic process.

PLATE 1.

Map of Eastern Equatorial Africa.

PLATE 2.

Mounted hyenas in the U. S. National Museum:

Upper figure. Highland Striped Hyena (*Hyæna hyæna schillingsi*). Adult female; Cat. No. 163110; Olarakeri, Sotik, British East Africa, July 1, 1909. Edmund Heller.

Lower figure. Eastern Spotted Hyena (*Crocuta crocuta germinans*). Adult female; Cat. No. 163106; southwest side of Mount Kenia, British East Africa, October 12, 1909. J. A. Loring.

PLATE 3.

Palatal views of skulls of *Hyæna* (two-thirds natural size):

Upper figure. *Hyæna hyæna bergeri*. Adult female; Cat. No. 182040; Lakiundu River, British East Africa, July 12, 1911. E. Heller.

Lower figure. *Hyæna dubia*. Adult female; Cat. No. 172923; "Habesch," Eritrea. G. Schrader.

PLATE 4.

Group of mounted East African Lions in U. S. National Museum:

Felis leo massaica. Adult male, 2 adult females, and 2 young. Collected by Col. Theodore Roosevelt. Group designed and built by George B. Turner.

PLATE 5.

Mounted East African Leopard and Cheetah in U. S. National Museum:

Upper figure. East African Leopard (*Felis pardus suahelica*). Adult male; Cat. No. 163095; Meru, British East Africa, September 7, 1909. E. Heller.

Lower figure. Rainey's Cheetah (*Acinonyx jubatus raineyi*). Adult male; Cat. No. 161922; Wami Hill, Kapiti Plains, British East Africa, May 2, 1909. Kermit Roosevelt.

PLATE 6.

Skulls of type-specimens (natural size).

Figs. 1, 2. *Erinaceus sotikæ* Heller. Adult male; Cat. No. 162112. (=*Erinaceus albiventris hindei*.)

3. *Elephantulus rufescens mariakanæ* Heller. Adult female; Cat. No. 181821.

4, 5. *Elephantulus phæus* Heller. Adult male; Cat. No. 162074. (=*Elephantulus rufescens phæus*.)

6, 7. *Petrodomus sultani sangi* Heller. Adult male; Cat. No. 181822. (=*Cercoctenus sultan sangi*.)

PLATE 7.

Skulls of type-specimens (natural size).

Figs. 1, 2. *Surdisorex polulus* Hollister. Adult male; Cat. No. 163992.
3, 4. *Crocidura daphnia* Hollister. Adult female; Cat. No. 164898.
5, 6. *Sylvisorex gemmeus* Heller. Adult male; Cat. No. 164644.
7, 8. *Pachyura lixa aequatoria* Heller. Adult male; Cat. No. 181814.
9, 10. *Crocidura lutrella* Heller. Adult male; Cat. No. 164640.
11, 12. *Crocidura sururæ* Heller. Adult male; Cat. No. 164637.
13, 14. *Crocidura simiolus* Hollister. Adult female; Cat. No. 197959.
15, 16. *Crocidura suahelæ* Heller. Adult male; Cat. No. 181815.
17, 18. *Crocidura parvipes nisa* Hollister. Adult female; Cat. No. 182440.

PLATE 8.

Skulls of type-specimens (natural size).

Figs. 1, 2. *Crocidura mutesæ* Heller. Adult female; Cat. No. 164636.
3, 4. *Crocidura nilotica* Heller. Adult female; Cat. No. 164638. (=*Crocidura turba nilotica*.)
5, 6. *Crocidura turba lakiundæ* Heller. Adult female; Cat. No. 181816. (=*Crocidura turba zaodon*.)
7, 8. *Crocidura alchemillæ* Heller. Adult male; Cat. No. 163087. (=*Crocidura fumosa fumosa*.)
9, 10. *Crocidura raineyi* Heller. Adult male; Cat. No. 181817.
11, 12. *Crocidura maanjæ* Heller. Adult male; Cat. No. 164639. (=*Crocidura hildegardeæ hildegardeæ*.)
13, 14. *Crocidura lutreola* Heller. Adult female; Cat. No. 181818. (=*Crocidura hildegardeæ hildegardeæ*.)
15, 16. *Crocidura hildegardeæ procera* Heller. Adult female; Cat. No. 181820. (=*Crocidura hildegardeæ hildegardeæ*.)

PLATE 9.

Skull of type-specimen of *Heliosorex roosevelti* Heller. Adult female; Cat. No. 164643. (From Smithsonian Misc. Coll., vol. 56, No. 15, pl. 1. December 23, 1910.) Twice natural size. (=*Crocidura roosevelti*.)

PLATE 10.

Skulls of type-specimens (natural size).

Figs. 1, 2. *Crocidura hildegardeæ altæ* Heller. Adult male; Cat. No. 181819.
3, 4. *Crocidura planiceps* Heller. Adult male; Cat. No. 164641. (=*Crocidura bicolor planiceps*.)
5, 6. *Crocidura alpina* Heller. Adult female; Cat. No. 163089. (=*Crocidura allex alpina*.)
7, 8. *Crocidura littoralis* Heller. Adult male; Cat. No. 164642.
9, 10. *Lavia rex* Miller. Adult male; Cat. No. 38197. (=*Lavia frons rex*.)
11, 12. *Rhinolophus keniensis* Hollister. Adult male; Cat. No. 166352.
13, 14. *Pipistrellus helios* Heller. Adult male; Cat. No. 181813.
15, 16. *Pipistrellus aero* Heller. Adult male; Cat. No. 181812.
17, 18. *Eptesicus ugandæ* Hollister. Adult female; Cat. No. 166520.
19, 20. *Miniopterus natalensis arenarius* Heller. Adult female; Cat. No. 181811.

PLATE 11.

Skulls of type-specimens (natural size).

Figs. 1, 2. *Chærephon pumilus naivashæ* Hollister. Adult male; Cat. No. 166658.
3, 4, 5. *Ictonyx capensis albescens* Heller. Adult male; Cat. No. 182724. (=*Ictonyx striatus albescens.*)

PLATES 12–13.

Skull of type-specimen of *Thos adustus bweha* Heller. Adult male; Cat. No. 182342. Natural size.

PLATES 14–15.

Skull of type-specimen of *Thos adustus notatus* Heller. Adult male; Cat. No. 181486. Natural size.

PLATES 16–17.

Skull of type-specimen of *Thos aureus bea* Heller. Adult female; Cat. No. 162904. Natural size.

PLATES 18–19.

Skull of type-specimen of *Thos mesomelas elgonæ* Heller. Adult male; Cat. No. 164699. Natural size.

PLATES 20–21.

Skull of type-specimen of *Thos mesomelas mcmillani* Heller. Adult female; Cat. No. 181483. Natural size.

PLATES 22–24.

Skull of type-specimen of *Otocyon virgatus* Miller. Adult male; Cat. No. 162126. (From Smithsonian Misc. Coll., vol. 52, plates 60, 61, and 62. December 18, 1909.) Natural size.

PLATE 25.

Skull of type-specimen of *Mellivora abyssinica* Hollister. Adult female; Cat. No. 171876. Natural size.

PLATES 26–27.

Skull of type-specimen of *Mellivora sagulata* Hollister. Adult male; Cat. No. 171875. Natural size.

PLATES 28–29.

Skull of type-specimen of *Aonyx capensis helios* Heller. Adult female; Cat. No. 175750. Natural size.

PLATE 30.

Skull of type-specimen of *Genetta pumila* Hollister. Adult male; Cat. No. 182704. Natural size.

PLATE 31.

Skull of type-specimen of *Nandinia binotata arborea* Heller. Adult male; Cat. No. 182374. Natural size.

PLATE 32.

Skulls of type-specimens (natural size).

Figs. 1, 2, 3. *Mungos dentifer* Heller. Adult female; Cat. No. 182732.
4, 5, 6. *Mungos sanguineus parvipes* Hollister. Adult male; Cat. No. 182739.

PLATE 33.

Skull of type-specimen of *Mungos sanguineus orestes* Heller. Adult male; Cat. No. 164152. Natural size.

PLATE 34.

Skulls of type-specimens (natural size).

Upper figures. *Bdeogale crassicauda omnivora* Heller. Adult female; Cat. No. 182275.
Lower figures. *Mungos paludinosus rubescens* Hollister. Adult male; Cat. No. 35251.
(=*Atilax paludinosus rubescens.*)

PLATE 35.

Skull of type-specimen of *Mungos albicaudus ferox* Heller. Adult female; Cat. No. 163294. Natural size. (=*Ichneumia albicauda ibeana.*)

PLATE 36.

Skulls of type-specimens (natural size).

Figs. 1, 2, 3, 4. *Helogale undulata affinis* Hollister. Adult male; Cat. No. 182715.
5, 6. *Mungos albicaudus dialeucos* Hollister. Adult male; Cat. No. 184794.
(=*Ichneumia albicauda dialeucos.*)

PLATE 37.

Skulls of type-specimens (natural size).

Figs. 1, 2. *Crossarchus fasciatus colonus* Heller. Adult female; Cat. No. 162132. Dorsal and lateral views.
3. *Proteles cristatus termes* Heller. Adult female; Cat. No. 181523. Dorsal view.

PLATE 38.

Skulls of type-specimens (natural size).

Figs. 1, 2. *Crossarchus fasciatus colonus* Heller. Adult female; Cat. No. 162132. Palatal view and mandible.
3. *Proteles cristatus termes* Heller. Adult female; Cat. No. 181523. Palatal view.

PLATES 39–40.

Skull of type-specimen of *Crocuta crocuta fisi* Heller. Adult male; Cat. No. 182078. One-half natural size.

PLATE 41.

Skull of type-specimen of *Acinonyx jubatus raineyi* Heller. Adult male; Cat. No. 182321. One-half natural size.

PLATE 42.

Skull of type-specimen of *Acinonyx jubatus velox* Heller. Adult male; Cat. No. 163096. One-half natural size.

PLATE 43.

Skull of type-specimen of *Felis leo roosevelti* Heller. Adult male; Cat. No. 144054 One-third natural size.

PLATES 44–45.

Skull of type-specimen of *Felis pardus chui* Heller. Adult male; Cat. No. 164764. One-half natural size.

PLATES 46–47.

Skull of type-specimen of *Felis pardus fortis* Heller. Adult male; Cat. No. 181600. One-half natural size. (=*Felis fortis*.)

PLATES 48–49.

Skull of type-specimen of *Felis ocreata nandæ* Heller. Adult male; Cat. No. 182367. Natural size.

PLATES 50–51.

Skull of type-specimen of *Felis ocreata taitæ* Heller. Adult female; Cat. No. 182220. Natural size.

PLATE 52.

Skull of wild-killed adult male *Felis leo massaica*. U.S.N.M., Cat. No. 155443; near Nairobi, British East Africa, 1908; collected by John Jay White. One-third natural size.

PLATE 53.

Skull of park-reared adult male *Felis leo massaica*. U.S.N.M., Cat. No. 199707; captured as small cub near Nairobi, British East Africa; died in Nat. Zool. Park, Washington. One-third natural size.

PLATE 54.

Skulls of adult female *Felis leo massaica* (one-third natural size).

Upper. Park-reared; U.S.N.M., Cat. No. 199524; captured as small cub near Nairobi, British East Africa; died in Nat. Zool. Park, Washington.

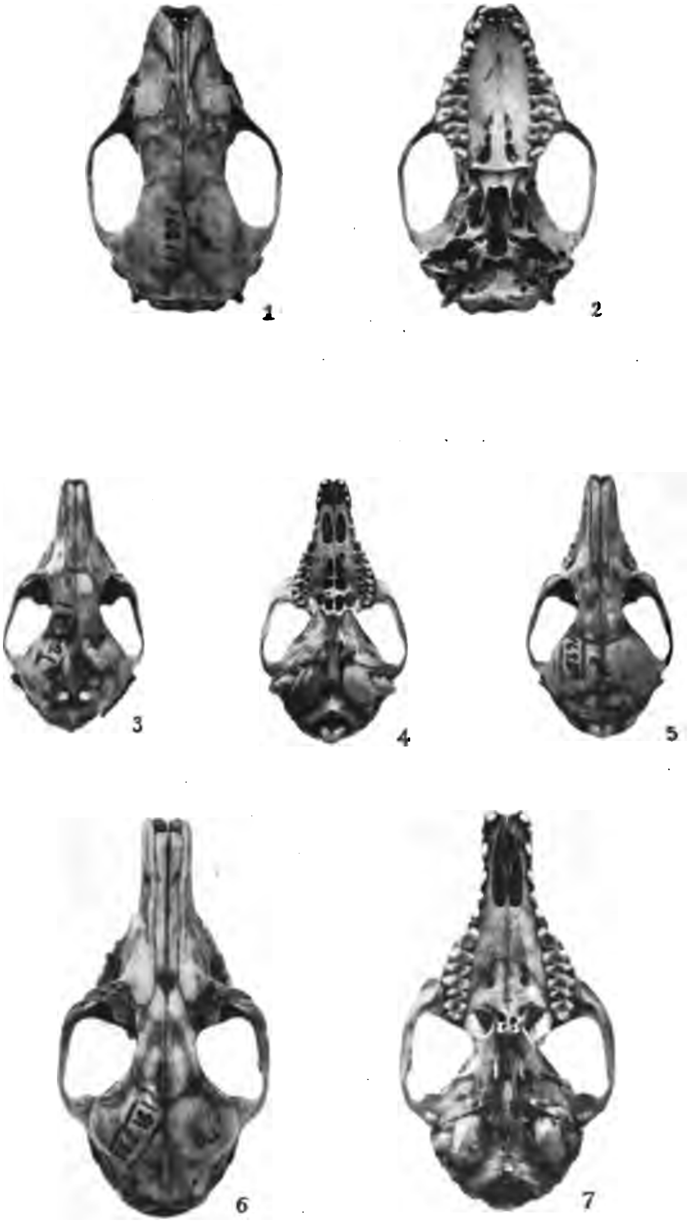
Lower. Wild-killed; U.S.N.M., Cat. No. 182326; Kapiti Station, British East Africa, 1911; collected by Paul J. Rainey.

PLATE 55.

Skulls of adult male *Felis leo massaica*, occipital views (reduced; same scale).

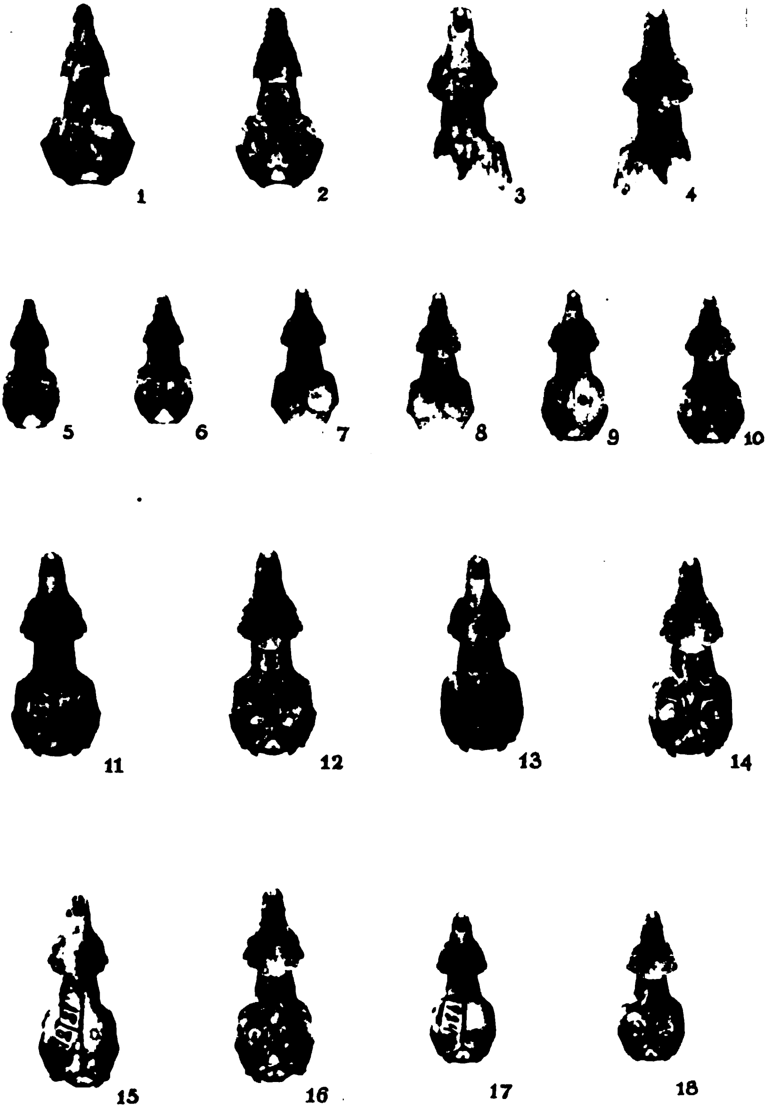
Upper. Wild-killed; U. S.N.M., Cat. No. 155443; near Nairobi, British East Africa; collected by John Jay White.

Lower. Park-reared; U.S.N.M., Cat. No. 199707; captured as small cub near Nairobi, British East Africa; died in Nat. Zool. Park, Washington.



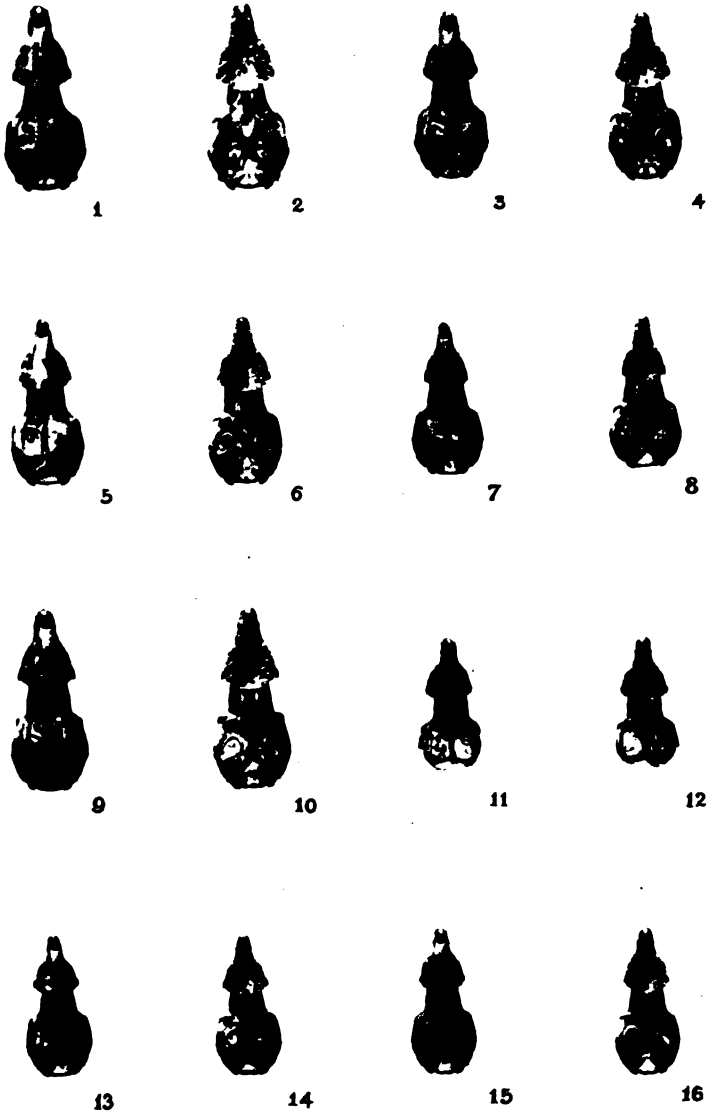
Skulls of Type-Specimens of East African Insectivores.
Natural Size.

For explanation of plate see page 181.



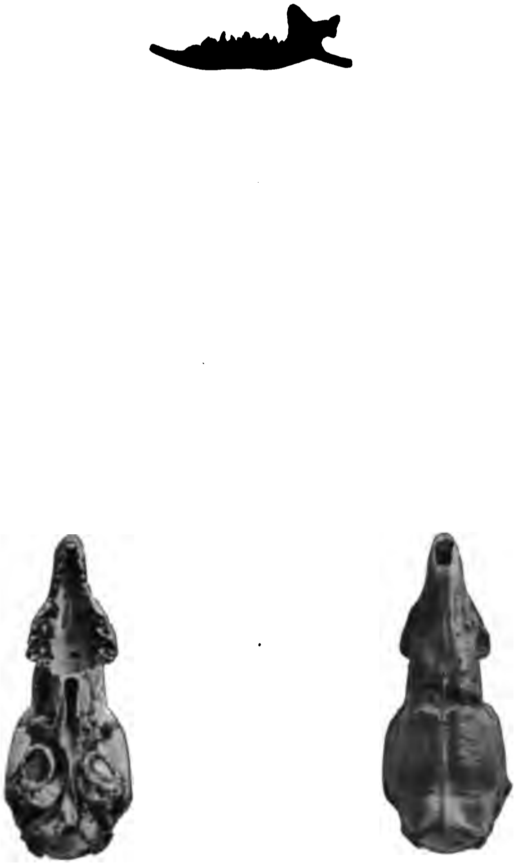
SKULLS OF TYPE-SPECIMENS OF EAST AFRICAN SORICIDAE.
NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 182.



SKULLS OF TYPE-SPECIMENS OF EAST AFRICAN SPECIES OF CROCIDURA.
NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 182.



Heliosorex (=Crocidura) roosevelti Heller. Type, Twice Natural Size.

For explanation of plate see page 182.

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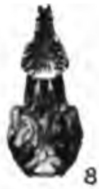
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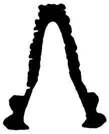
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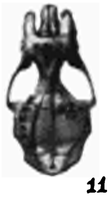
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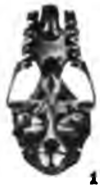
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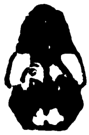
SKULLS OF TYPE-SPECIMENS OF EAST AFRICAN SHREWS AND BATS.
NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 182.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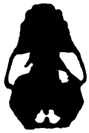
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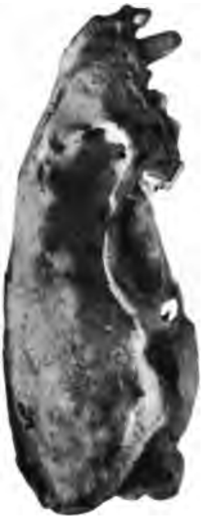
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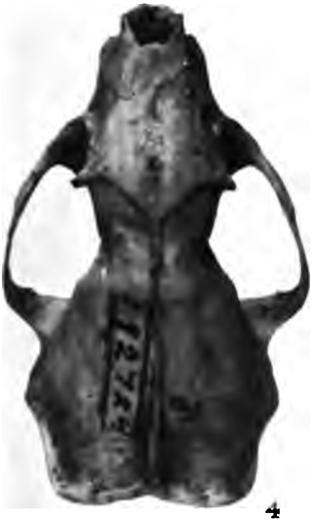
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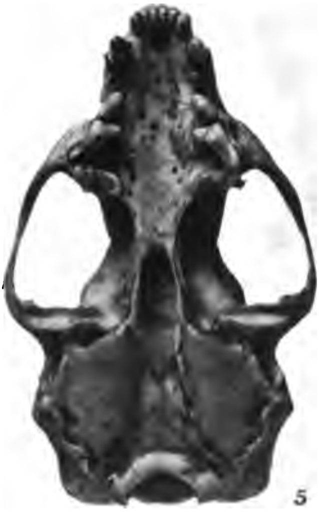
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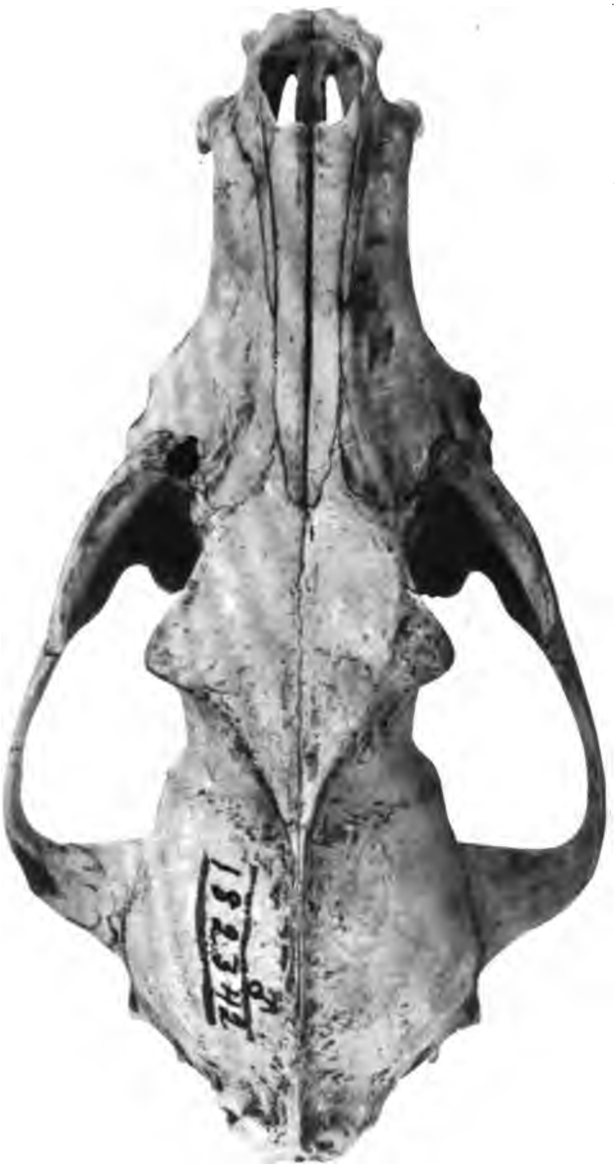
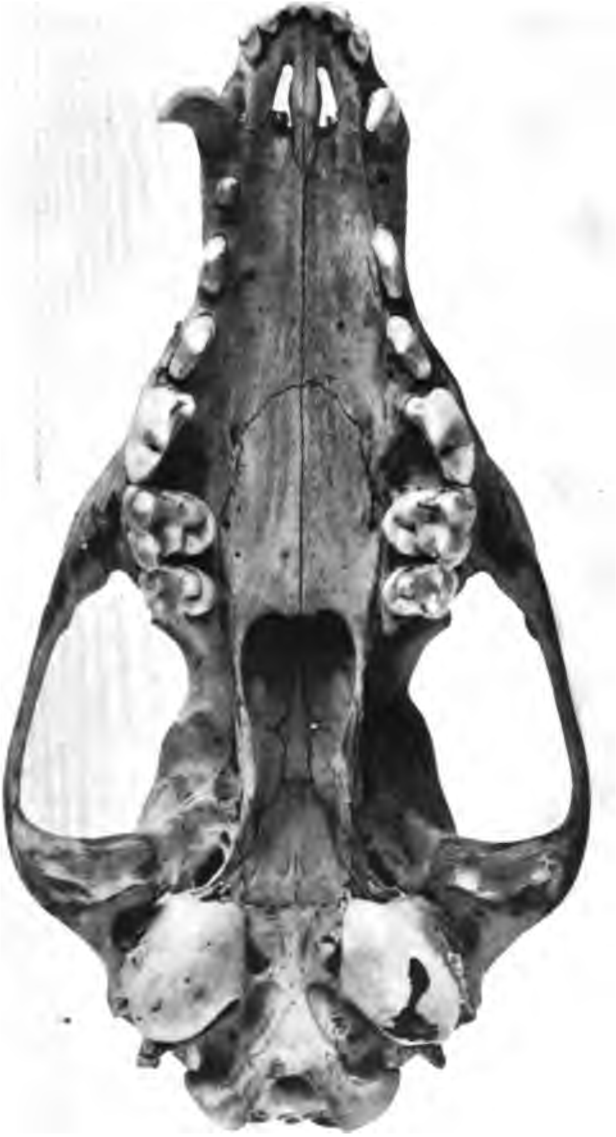
FIGS. 1–2, CHAEREPHON PUMILUS NAIVASHAE HOLLISTER: 3–5, ICTONYX STRIATUS ALBESCENS HELLER. TYPES, NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 183.



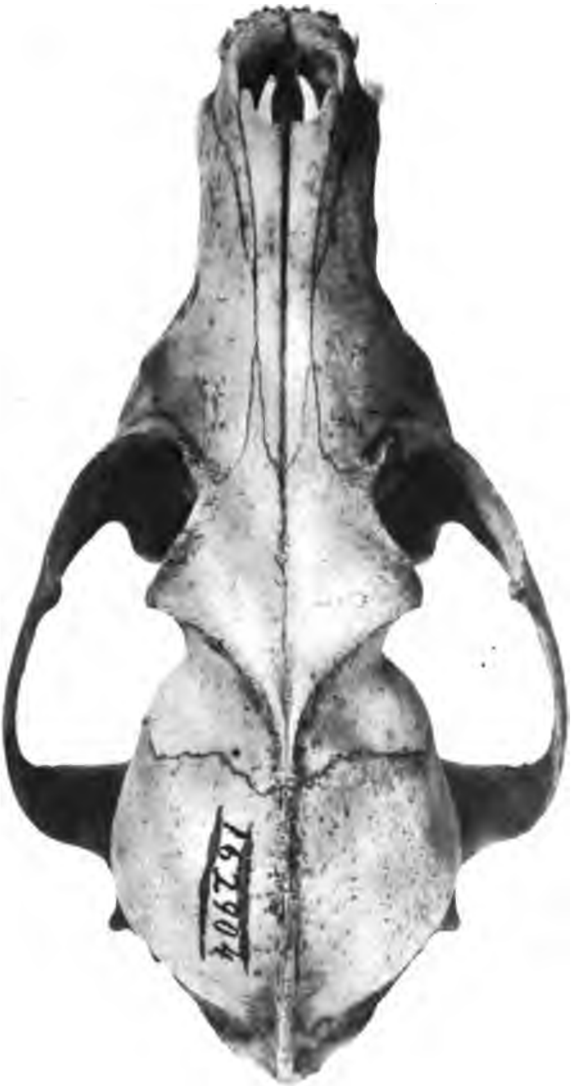
THOS ADUSTUS BWEHA HELLER. TYPE, NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 183.



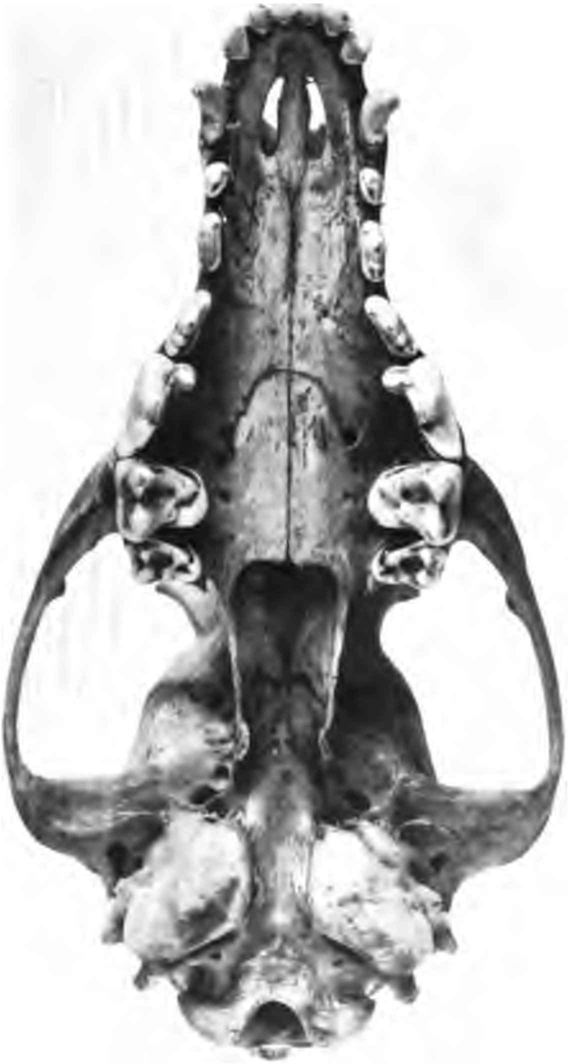
THOS ADUSTUS NOTATUS HELLER. TYPE, NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 183.



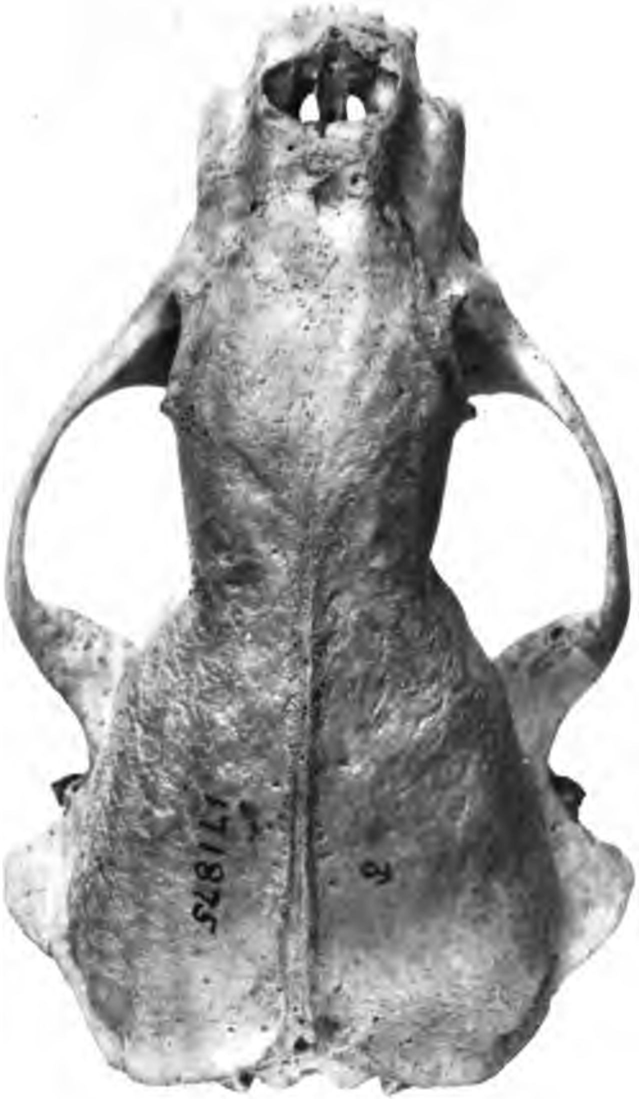
THOS AUREUS BEA HELLER. TYPE, NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 183.



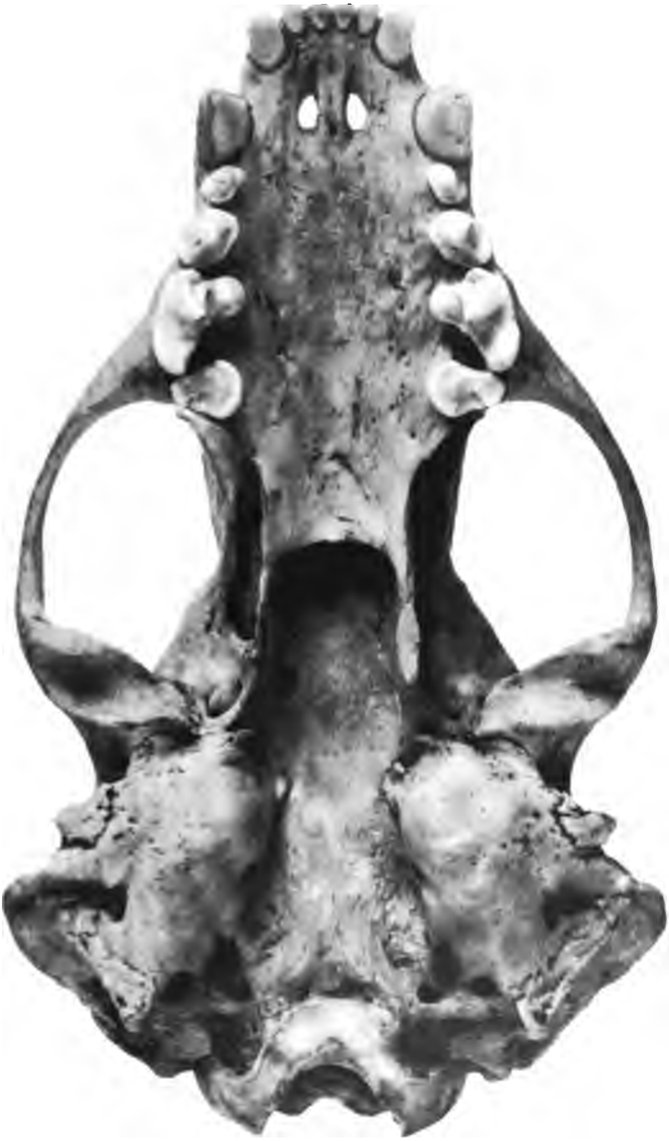
Thos aureus bea Heller. Type, Natural Size.

For explanation of plate see page 183.



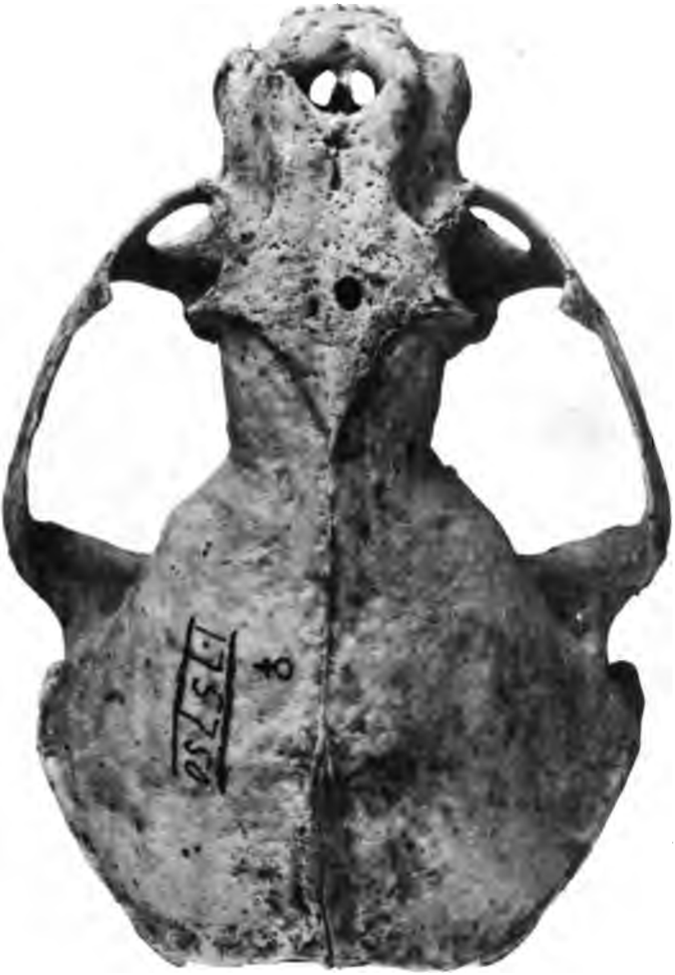
MELLIVORA SAGULATA HOLLISTER. TYPE, NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 183.



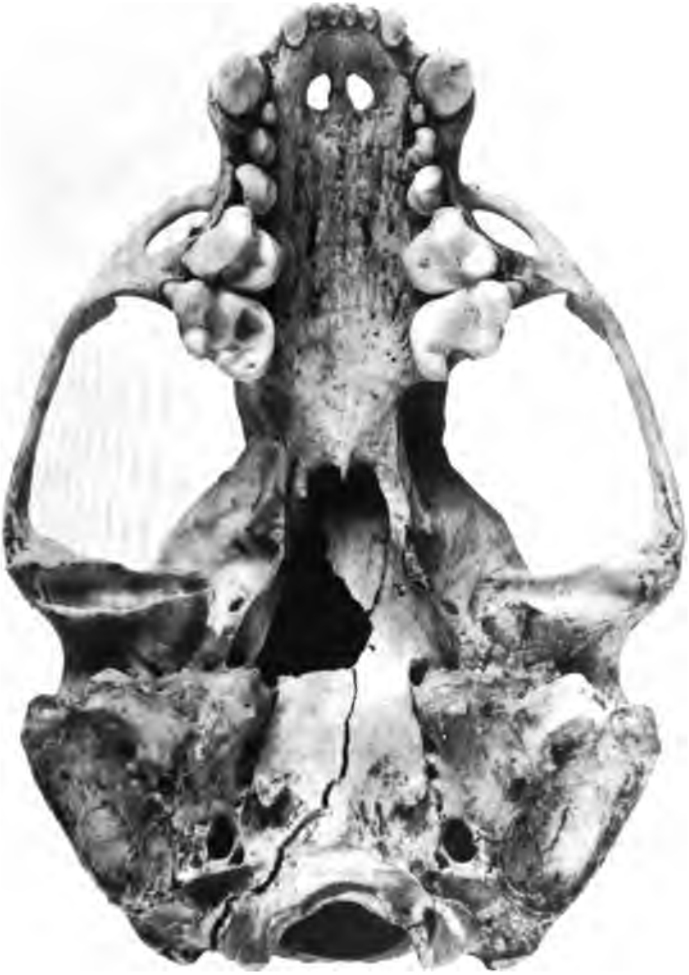
MELLIVORA SAGULATA HOLLISTER. TYPE, NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 183.



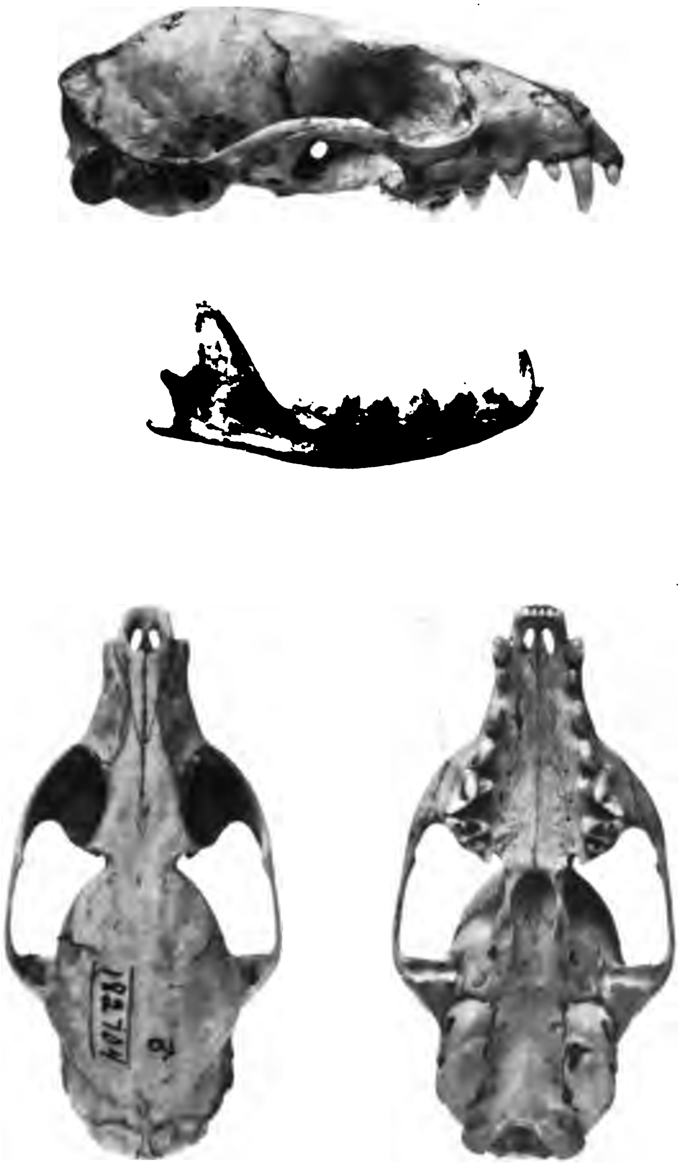
AONYX CAPENSIS HELIOS HELLER. TYPE, NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 183.



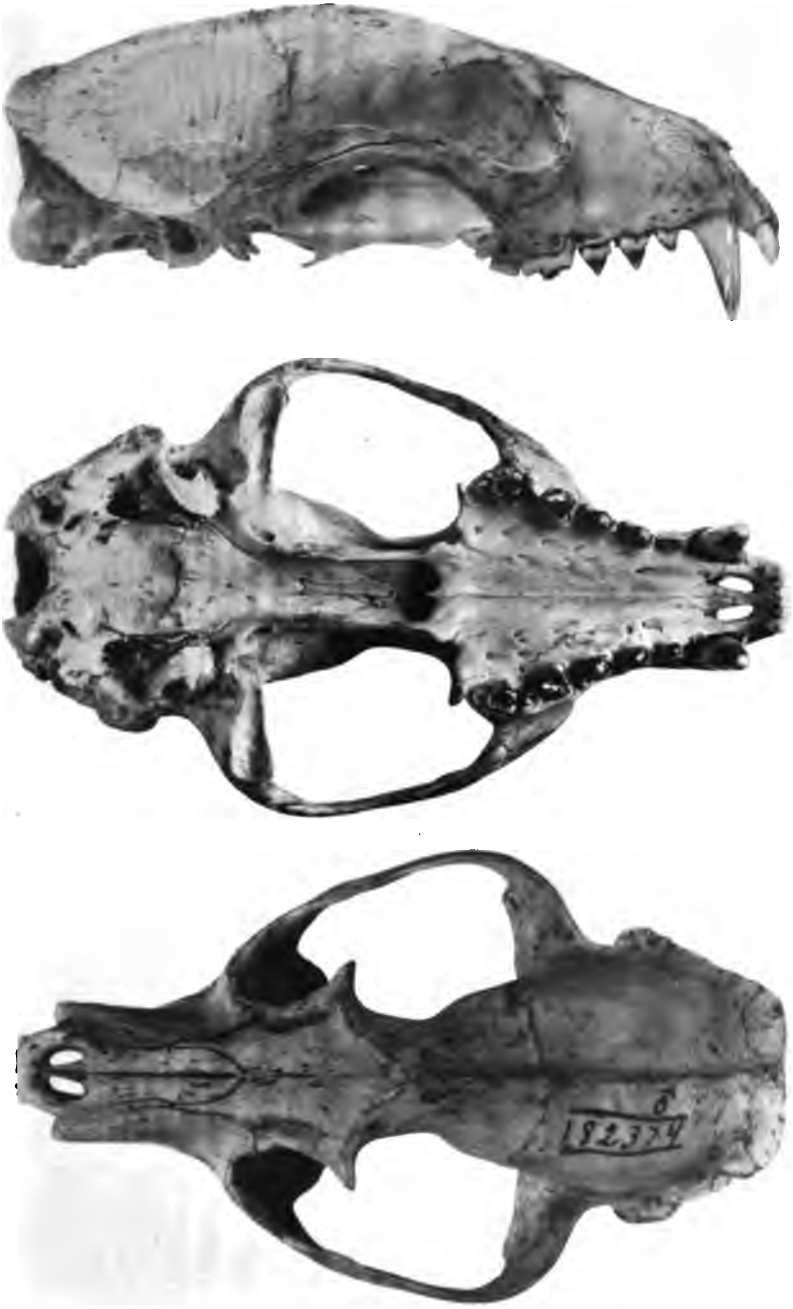
AONYX CAPENSIS HELIOS HELLER. TYPE, NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 183.



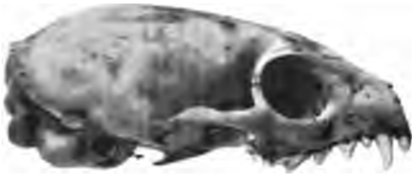
Genetta pumila Hollister. Type, Natural Size.

For explanation of plate see page 183.



Nandinia binotata arborea Heller. Type, Natural Size.

For explanation of plate see page 183.



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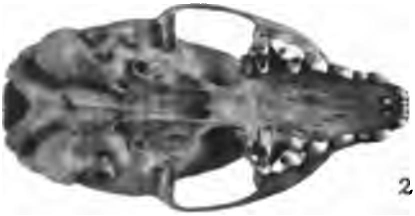

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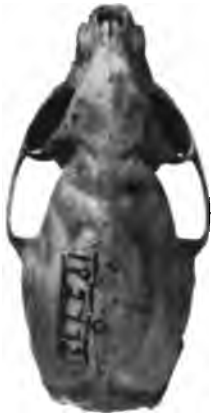

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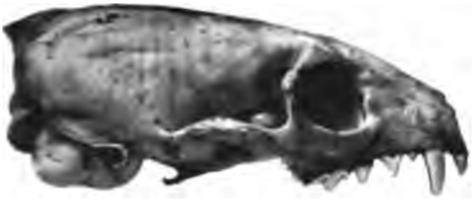

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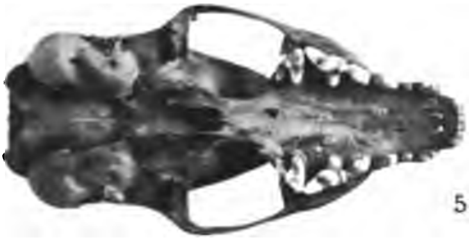

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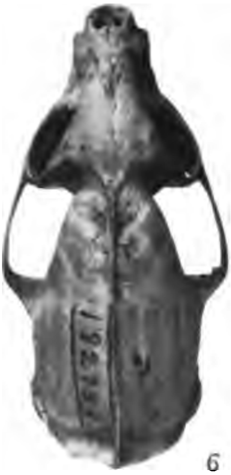

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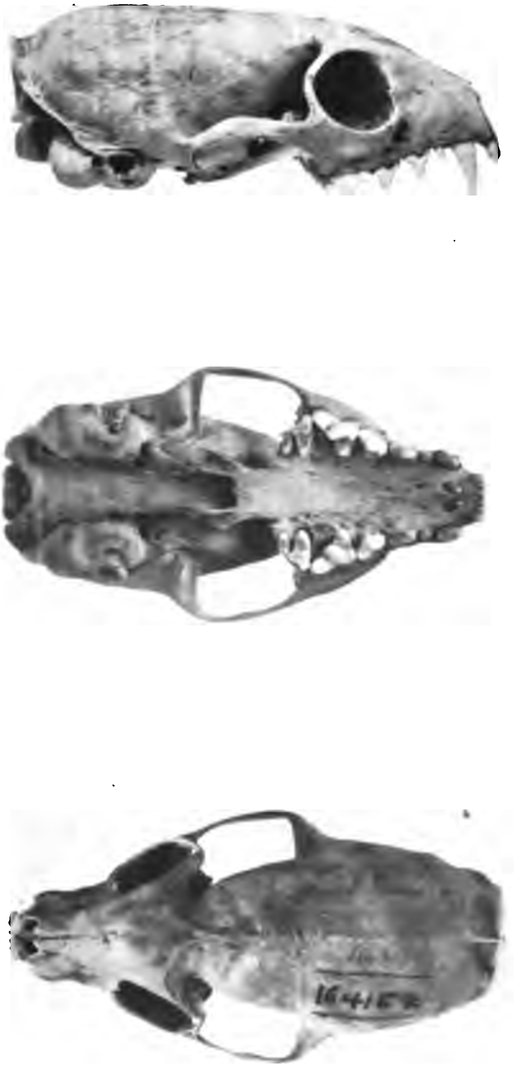
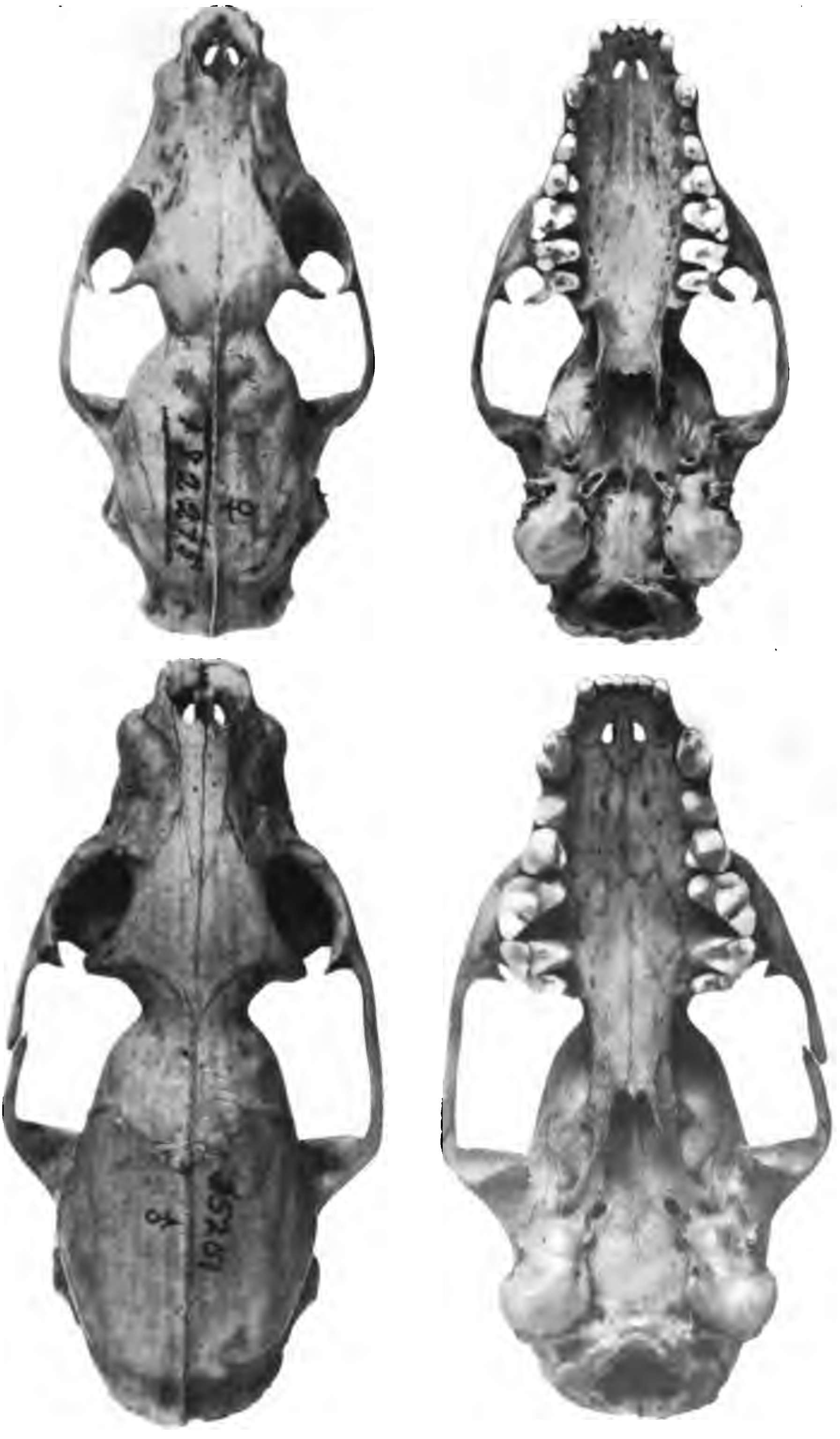
FIGS. 1–3, MUNGOS DENTIFER HELLER; 4–6, M. SANGUINEUS PARVIPES HOLLISTER. TYPES, NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 183.



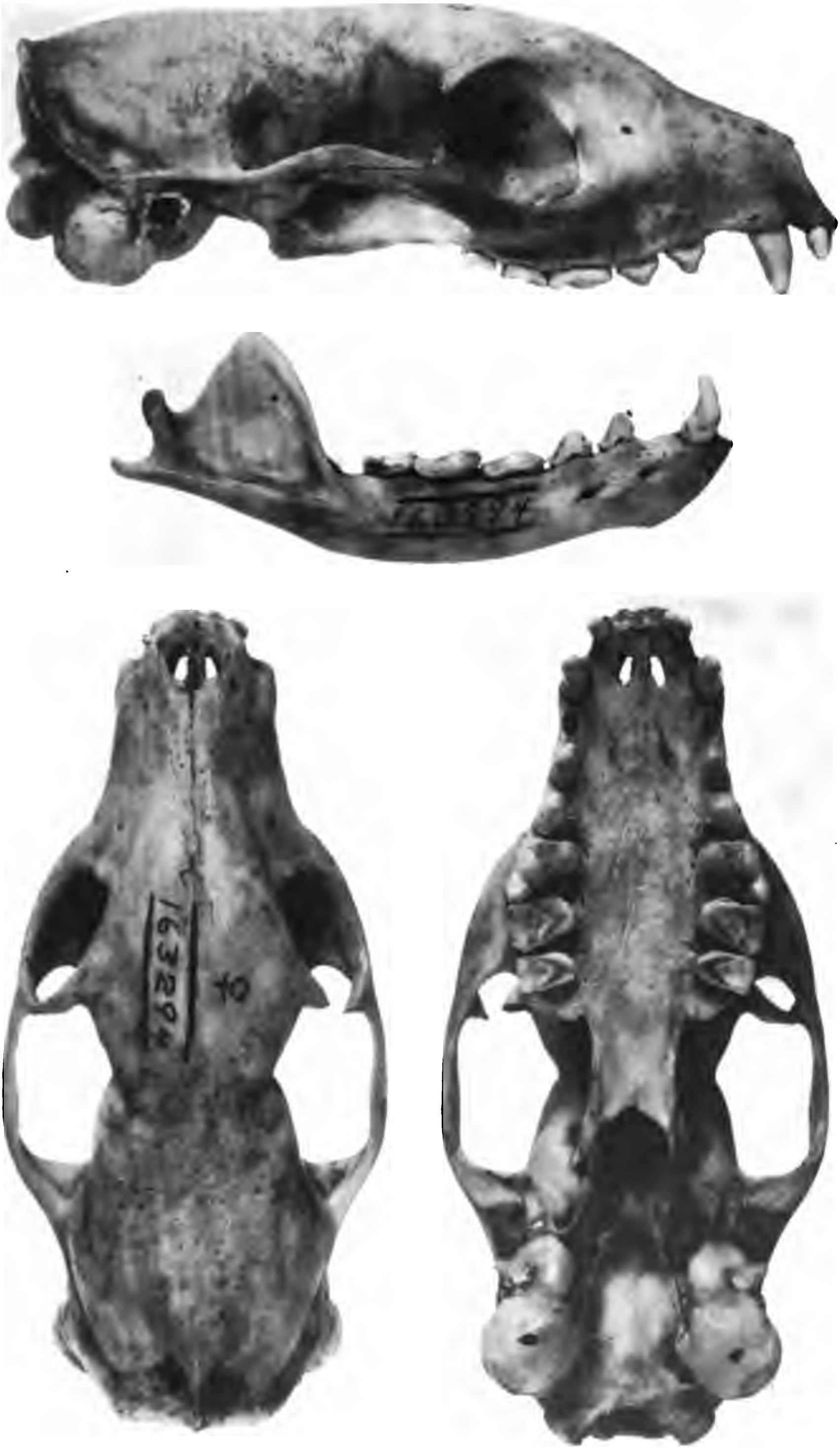
MUNGOS SANGUINEUS ORESTES HELLER. TYPE, NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 184.



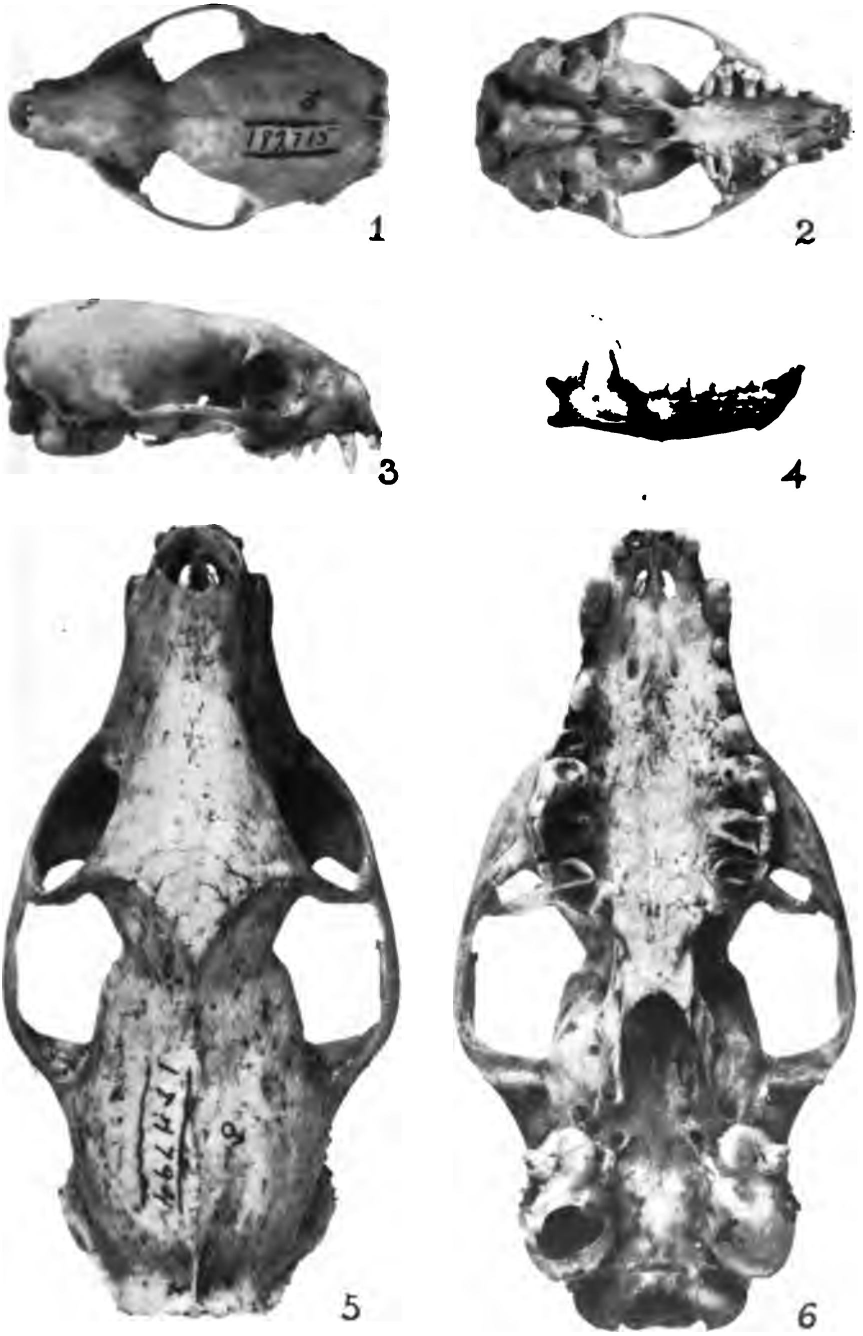
UPPER, BDEOGALE CRASSICAUDA OMNIVORA HELLER; LOWER, ATILAX PALUDINOSUS RUBESCENS (HOLLISTER). TYPES, NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 184.



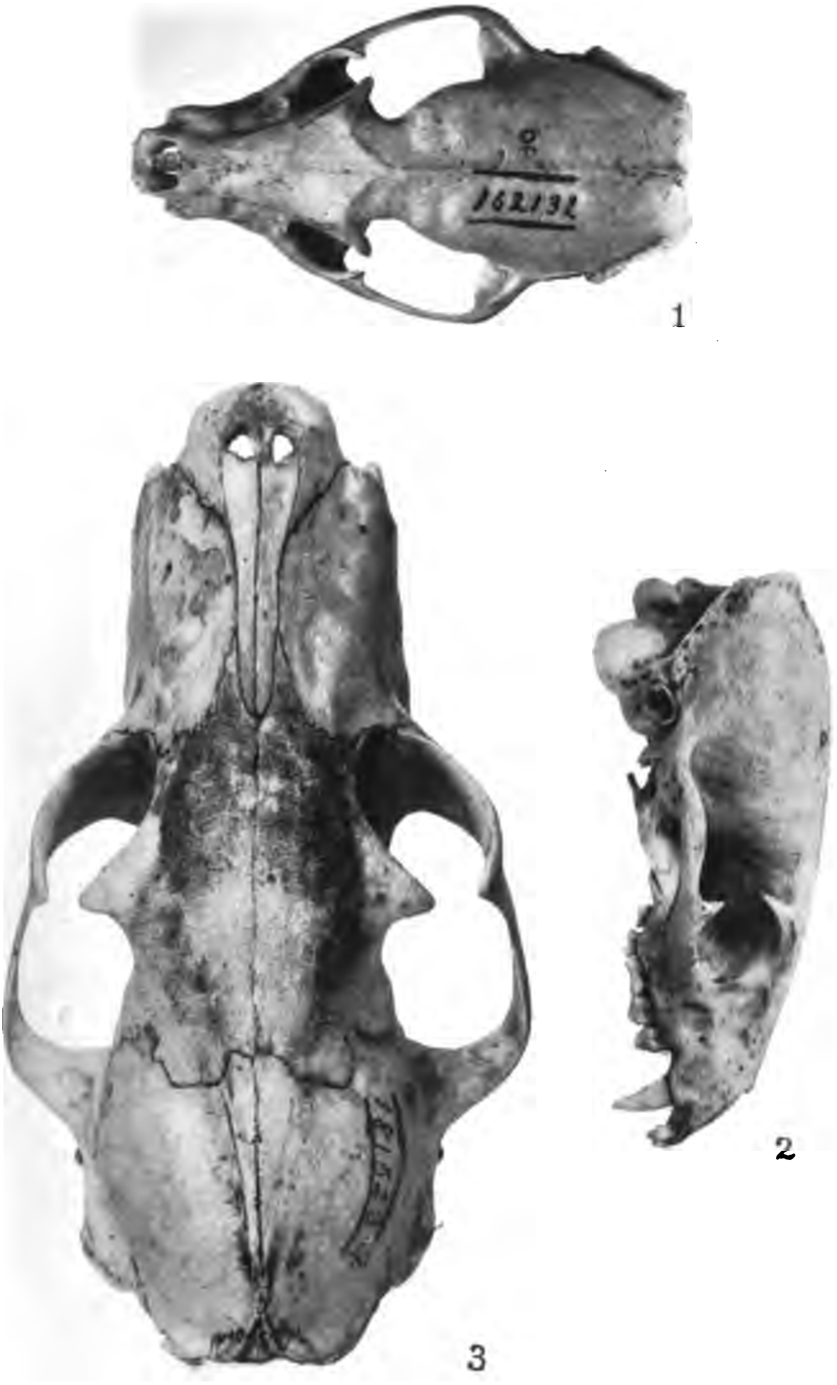
Mungos albicaudus ferox Heller. Type, Natural Size.

For explanation of plate see page 184.



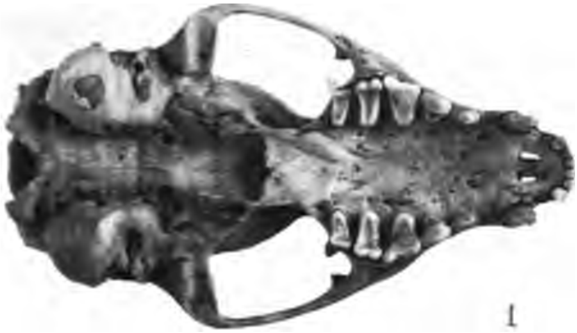
FIGS. 1–4, HELOGALE UNDULATA AFFINIS HOLLISTER; 5–6, ICHNEUMIA ALBICAUDA DIALEUCOS (HOLLISTER). TYPES, NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 184.



Figs. 1-2, Crossarchus fasciatus colonus Heller; 3, Proteles cristatus termes Heller. Types, Natural Size.

For explanation of plate see page 184.



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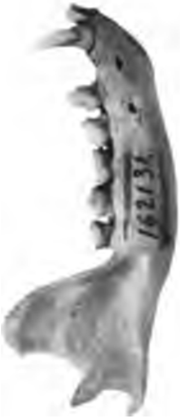

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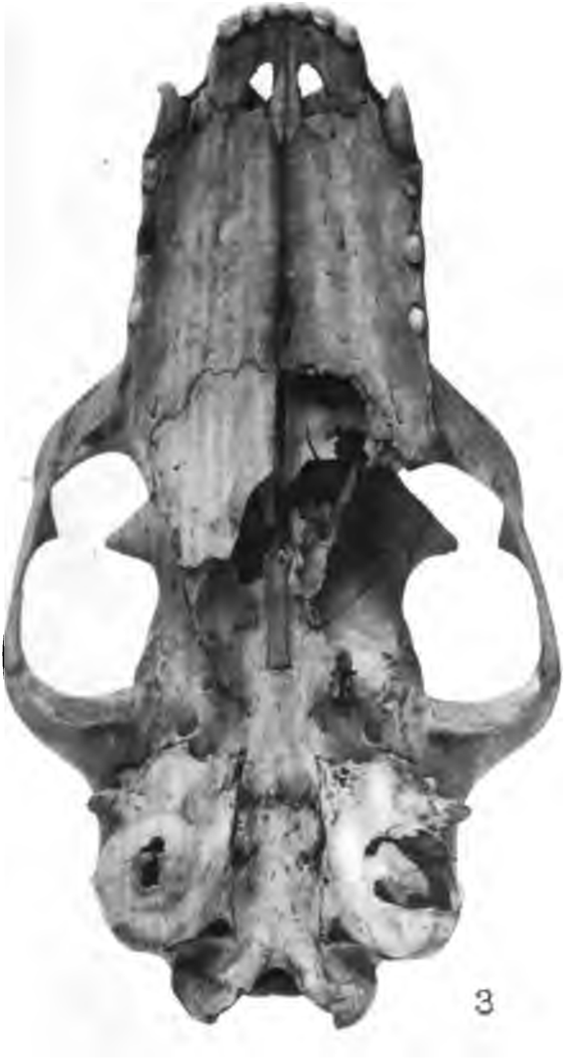

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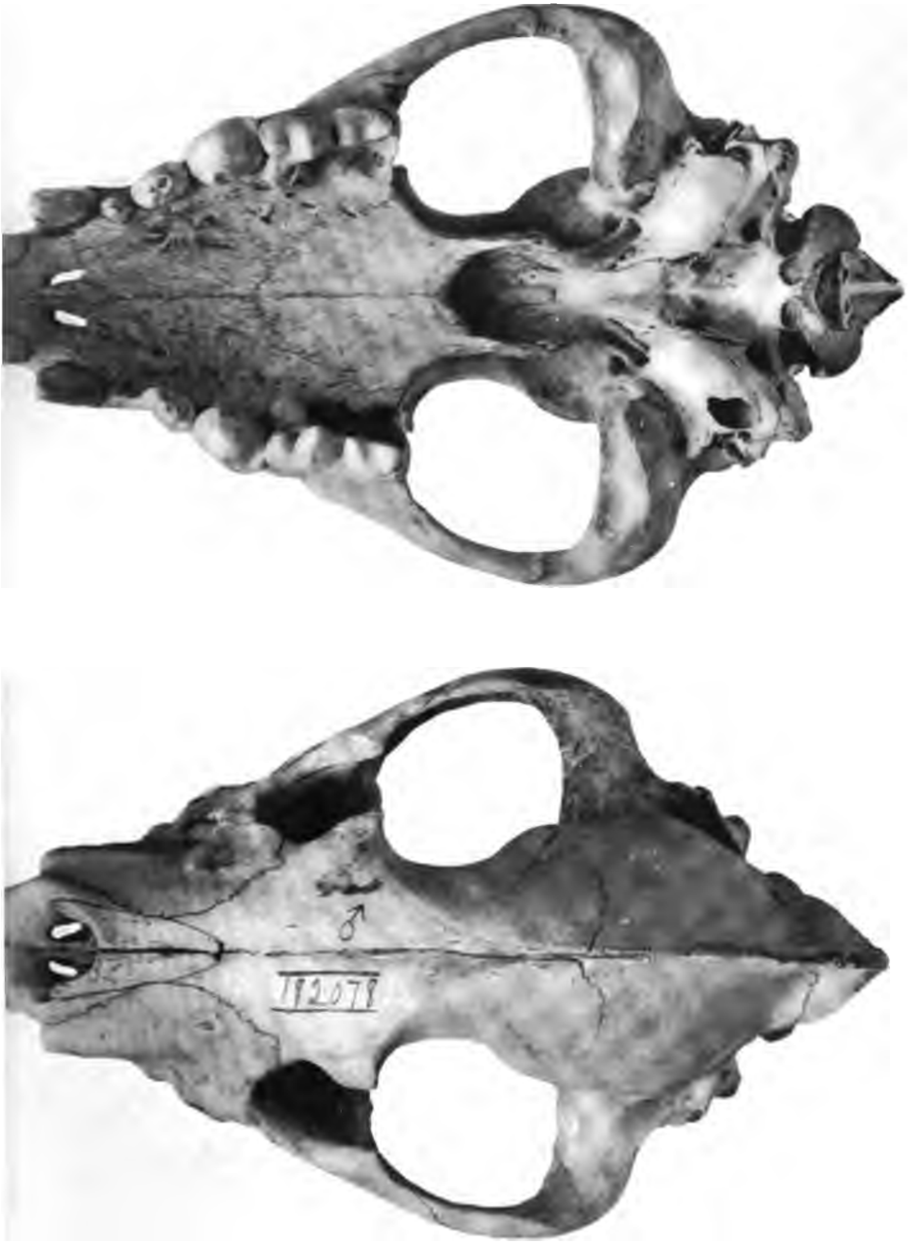
FIGS. 1–2, CROSSARCHUS FASCIATUS COLONUS HELLER; 3, PROTELES CRISTATUS TERMES HELLER. TYPES, NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 184.



CROCUTA CROCUTA FISI HELLER. TYPE. ONE-HALF NATURAL SIZE.

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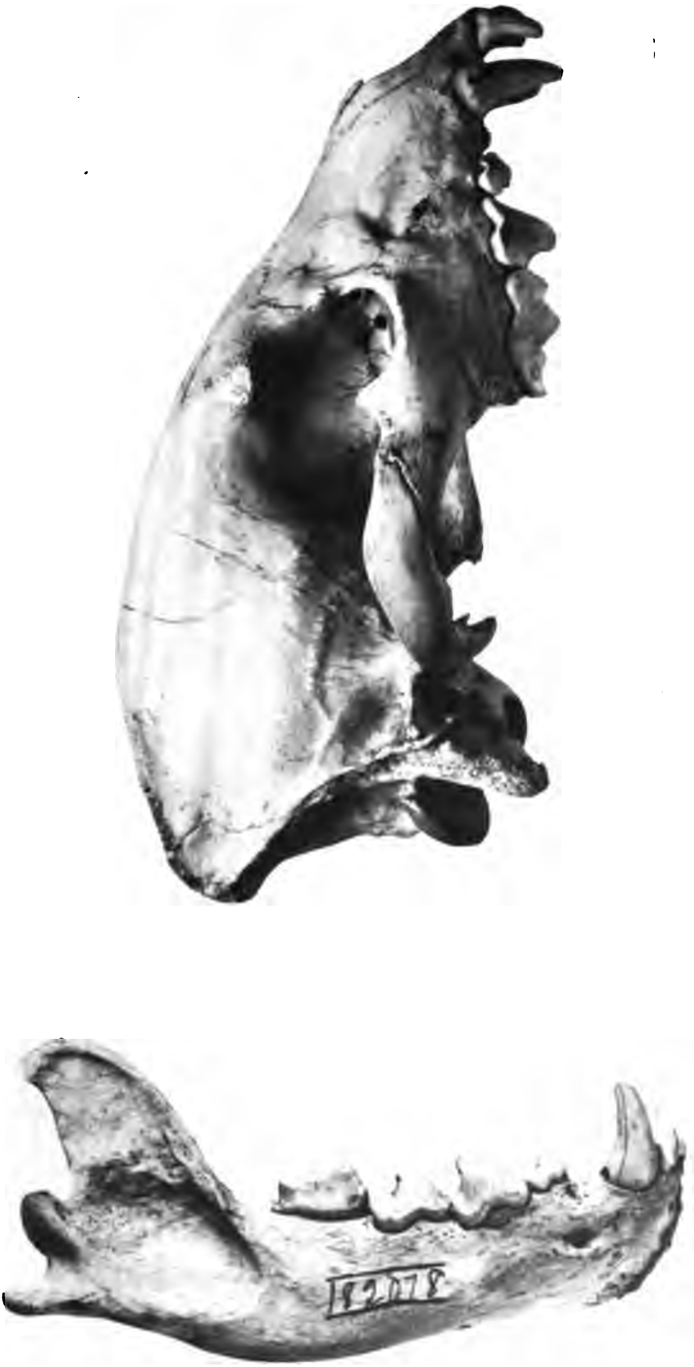
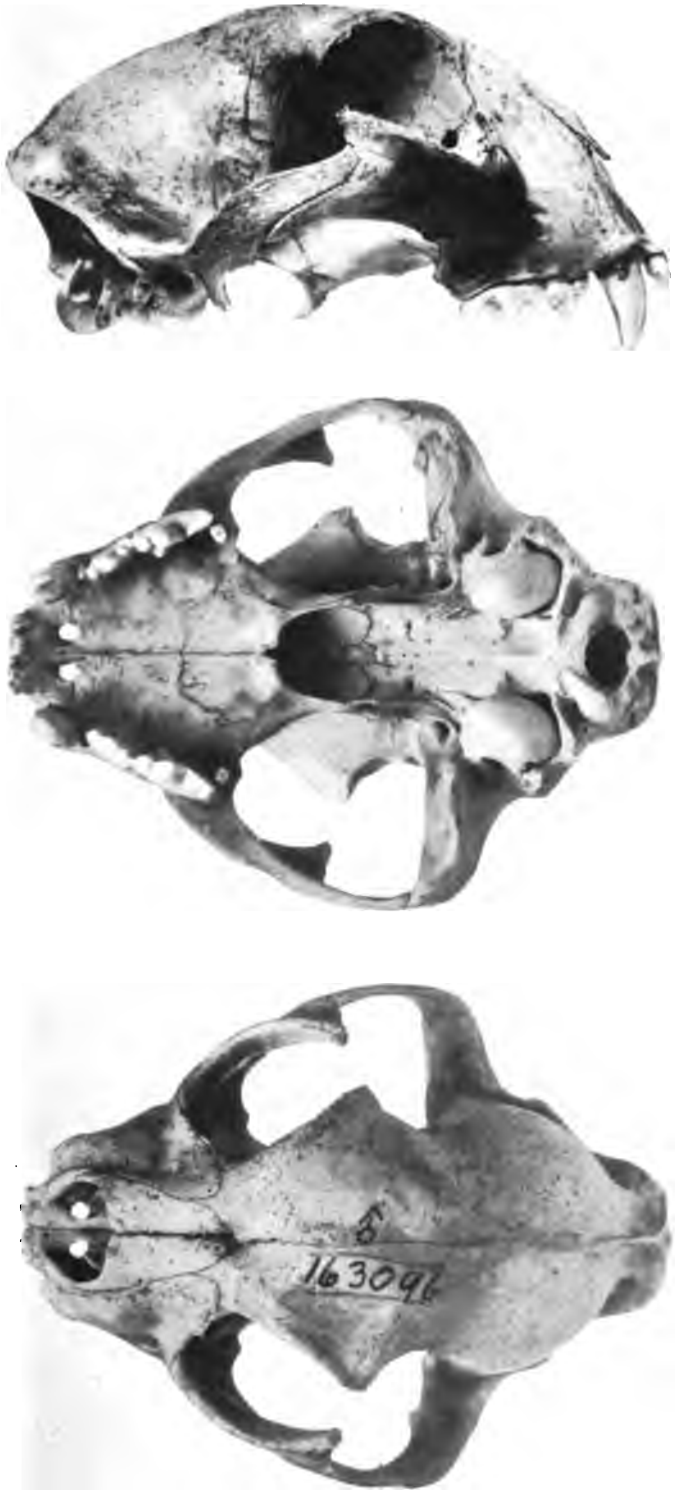


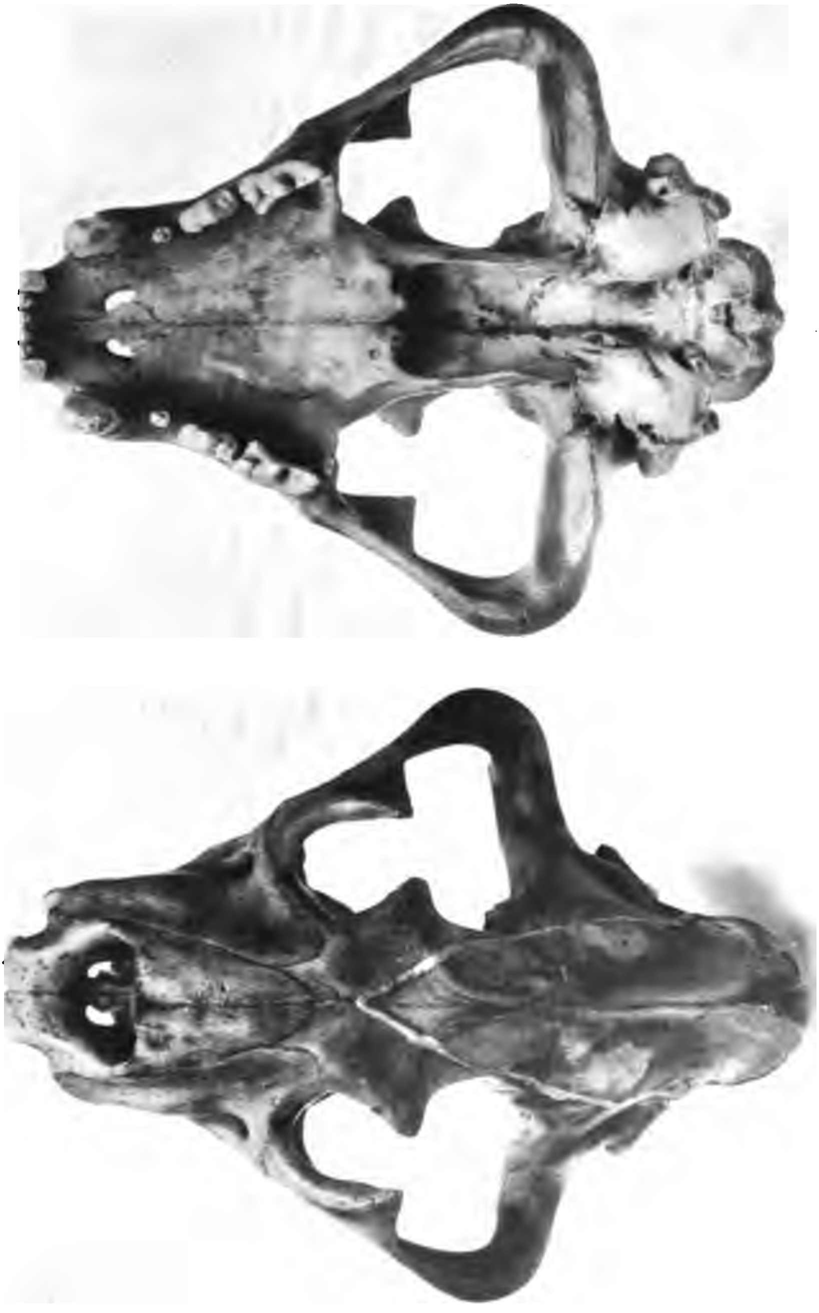
CROCUTA CROCUTA FISI HELLER. TYPE, ONE-HALF NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 184



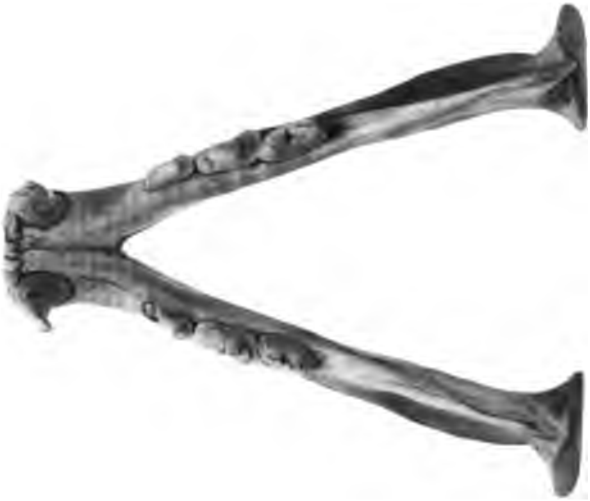
Acinonyx jubatus velox Heller. Type, One-Half Natural Size.

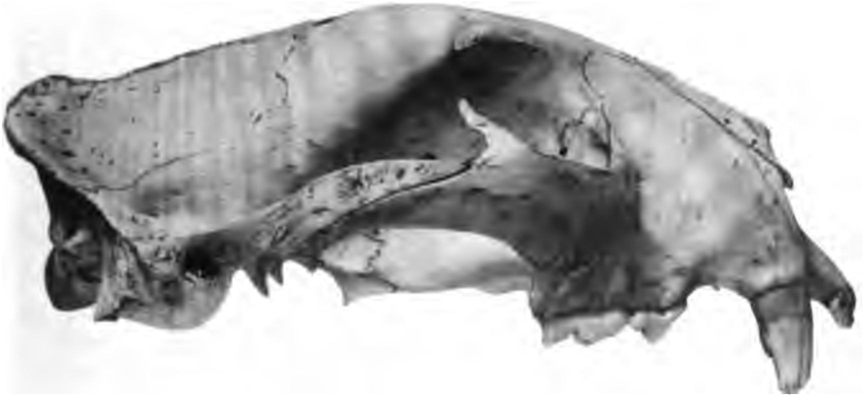
For explanation of plate see page 184.



FELIS LEO ROOSEVELTI HELLER. TYPE, ONE-THIRD NATURAL SIZE.

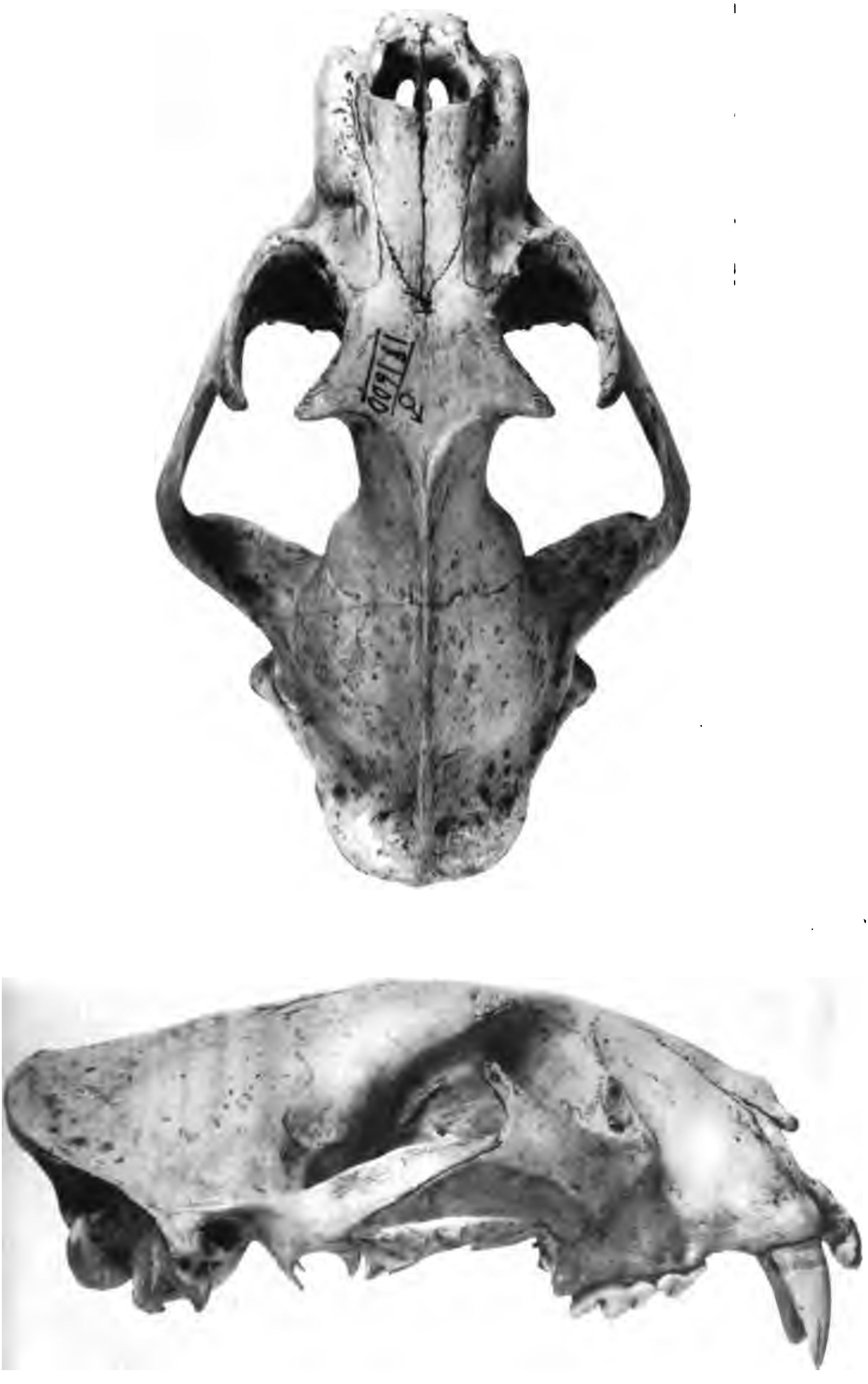
FOR EXPLANATION OF PLATE SEE PAGE 184.



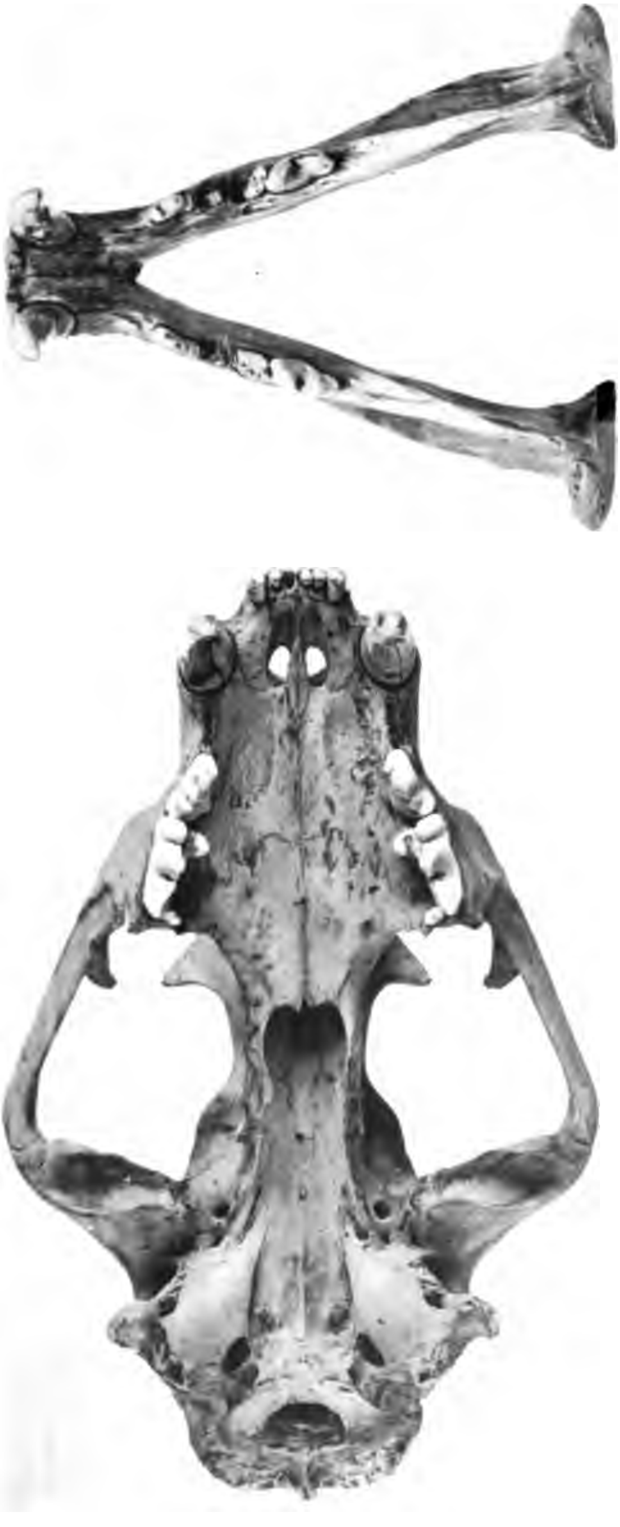


FELIS PARDUS CHUI HELLER. TYPE, ONE-HALF NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 184.

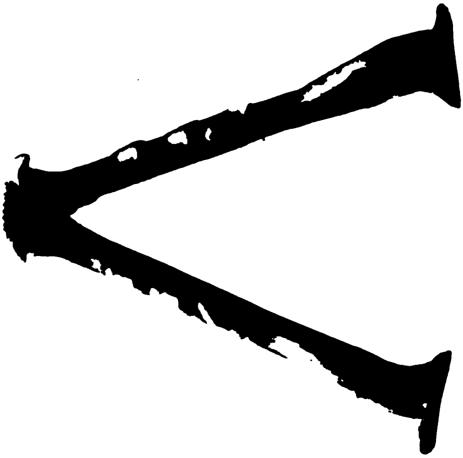


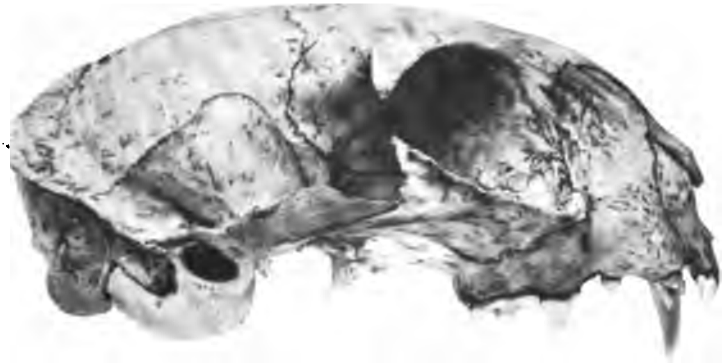
Felis fortis Heller. Type. One-Half Natural Size.
For explanation of plate see page 185.



FELIS FORTIS HELLER. TYPE, ONE-HALF NATURAL SIZE.

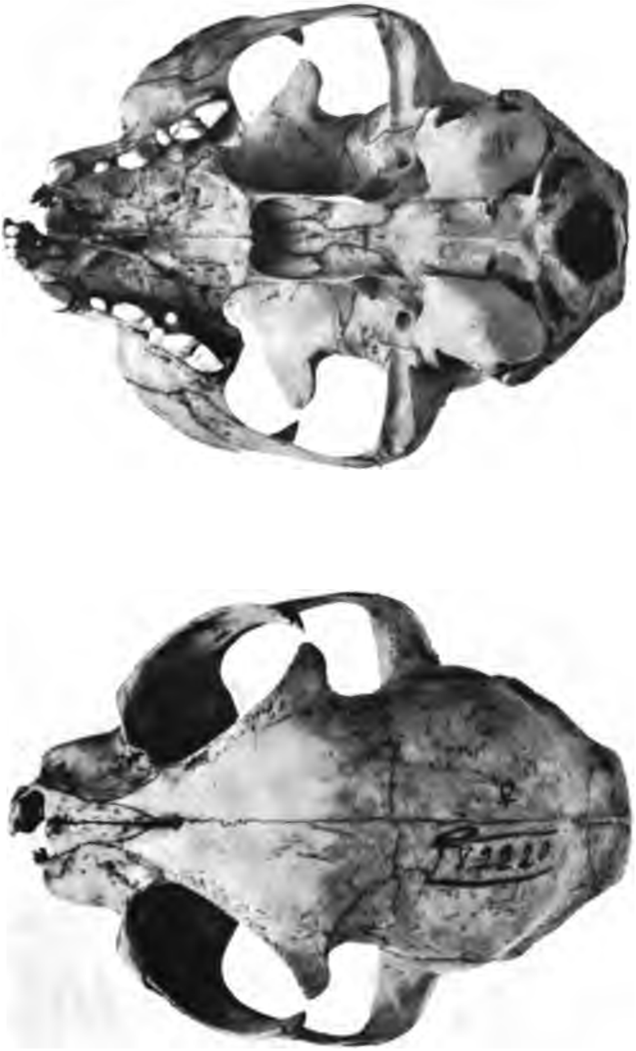
FOR EXPLANATION OF PLATE SEE PAGE 185.





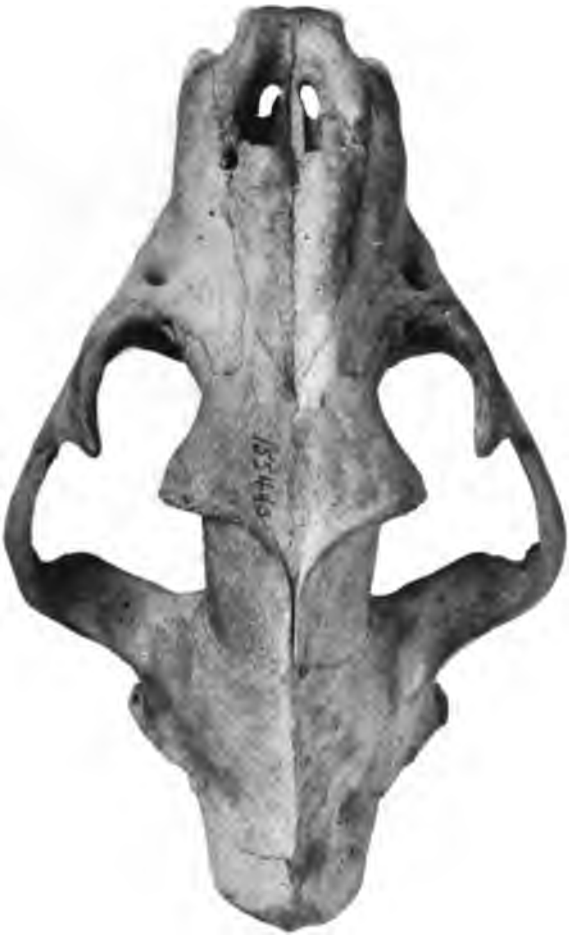
FELIS OCREATA NANDAE HELLER. TYPE, NATURAL SIZE.

FOR EXPLANATION OF PLATE SEE PAGE 185.



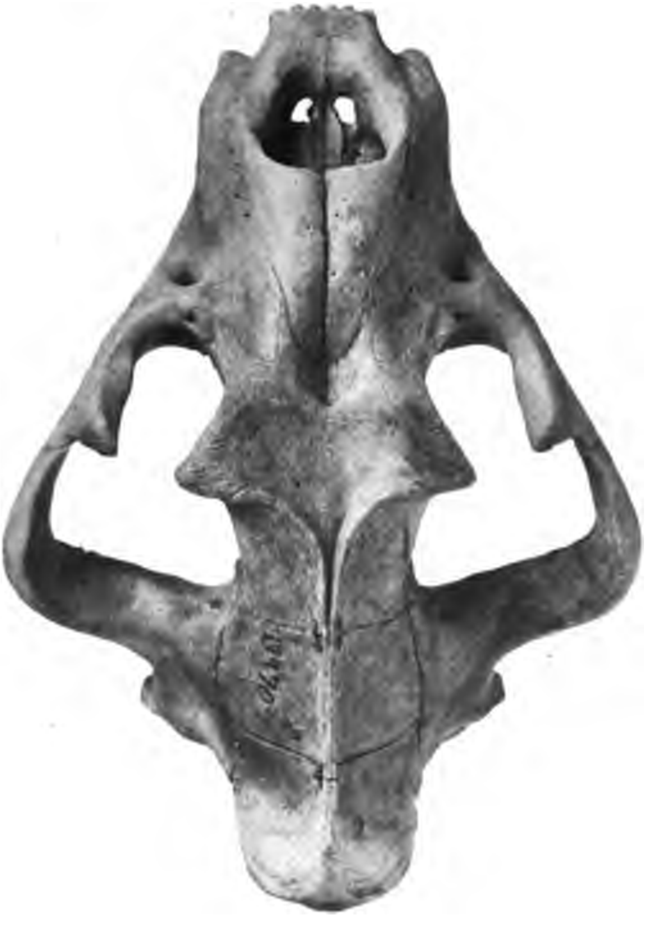
Felis ocreata taitae Heller. Type, Natural Size.

For explanation of plate see page 185.



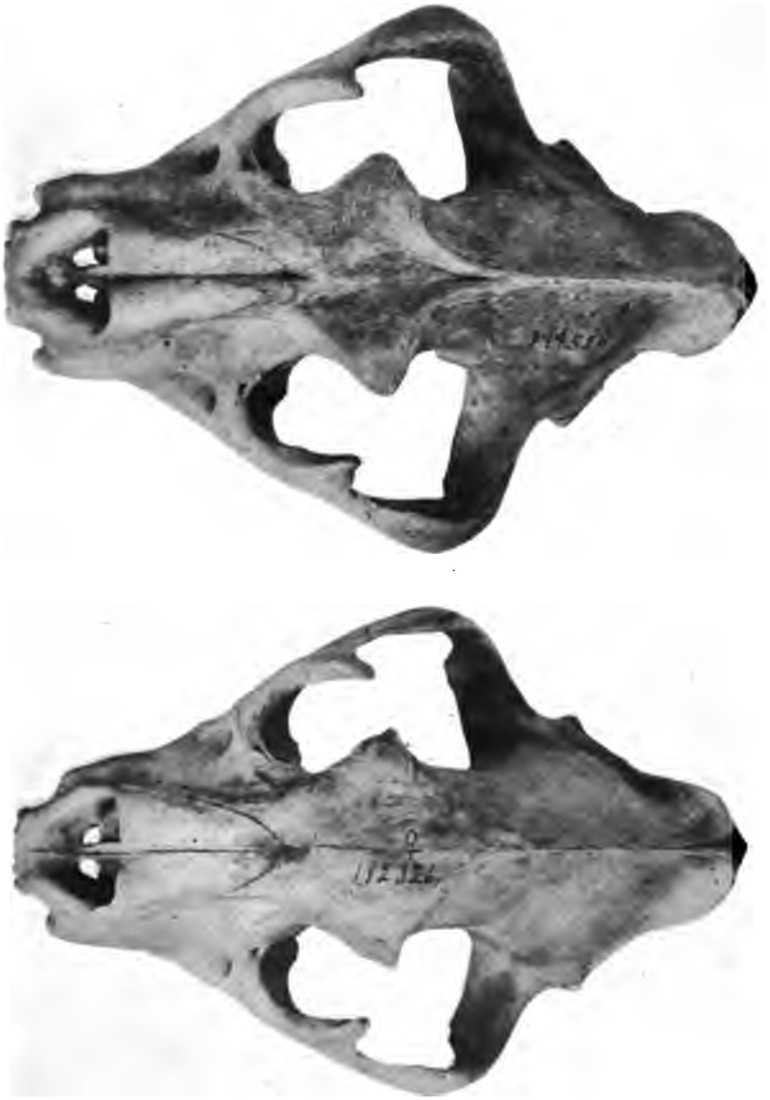
Skull of Wild-Killed Adult Male Felis leo massaica.

For explanation of plate see page 185.



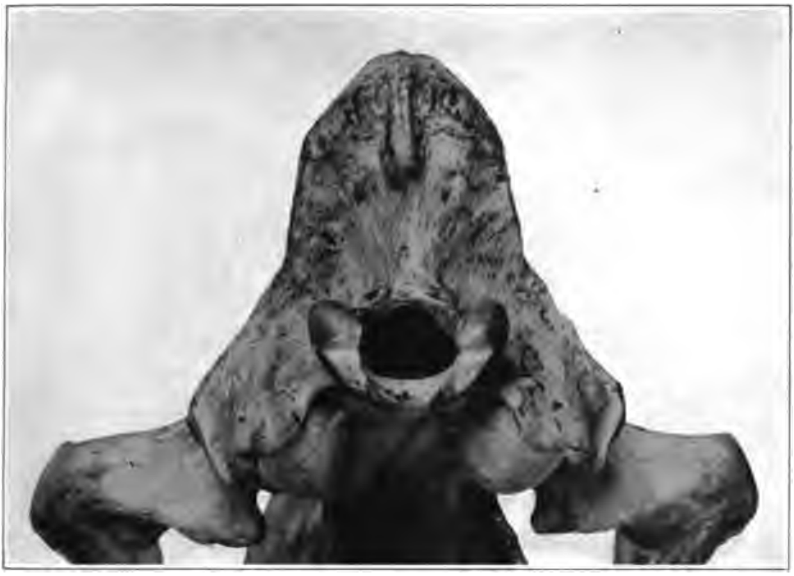
SKULL OF PARK-REARED ADULT MALE FELIS LEO MASSAICA.

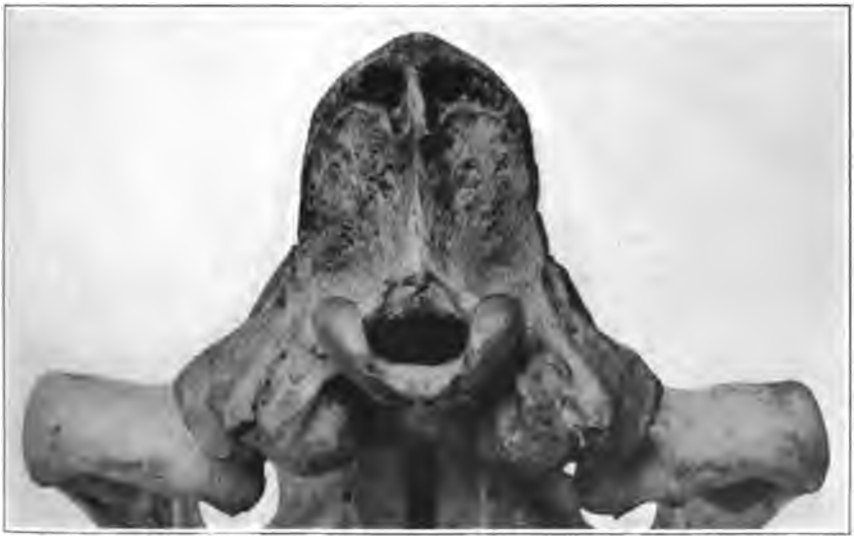
FOR EXPLANATION OF PLATE SEE PAGE 185



Skulls of Park-Reared (Upper) and Wild-Killed (Lower) Lionesses.

For explanation of plate see page 185.





SKULLS OF WILD-KILLED (UPPER) AND PARK-REARED (LOWER) LIONS.

FOR EXPLANATION OF PLATE SEE PAGE 185.

INDEX.

[Figures in black-faced type indicate generic or specific headings.]

Page.
aard-wolf 138
Abbott, Dr. W. L., expedition to Kilimanjaro 13
abyssinica, Mellivora **112**
Acinonyx **150**, 153, 154
    jubatus 150
    ngorongorensis 151
    raineyi **151**, 152, 153, 154
    sœmmeringii **152**
    velox 151, **152**, 153, 154
    venatica 150
    venator 150
    wagneri 152
adustus, Thos 101, 102
ægyptiacus, Nyctinomus **100**
    Rousettus 70
    Taphozous 72, 73
æquatoria, Pachyura 41
æro, Pipistrellus **90**, 91
æthiopica, Nycteris 74
    Petalia 74, 76
affinis, Helogale **132**, 133
    Lavia 77, 79, **80**
afra, Coleura **72**
    Emballonura 72
African civet 115
African palm civet 120
africanus, Nycticeius **98**
ahlselli, Helogale 133, **134**
albescens, Ictonyx **114**
albicauda, Ichneumia 127
albigula, Scotæcus 94
    Scotœcus **94**
albiventer, Nasilio **31**, 32
albiventris, Erinaceus **26**
albofuscus, Scotœcus 93
alchemillæ, Crocidura 55, 57
allex, Crocidura 66, **67**
Alopedon 101
alpina, Crocidura 67, **68**
altæ, Crocidura 63, **65**
amalæ, Crocidura 60
angolensis, Cynonycteris 70
    Rousettus **70**
anthus, Canis 101
    Thos 101
anurus, Epomophorus 71
Aonyx **115**
    capensis 115
    helios **115**
    hindei **115**
    meneleki 115
arborea, Nandinia **120**
arenarius, Miniopterus **95**
arge, Nycteris 73
    Petalia **73**, 75

Page.
Ariela 136
Asellia **88**
    tridens **88**
Atelerix **25**
Athylax robustus 126
Atilax **126**, 128
    paludinosus 126
    robustus **126**, 127, 129
    rubescens 127, 129
atkinsoni, Helogale **132**, 133
atratus, Erinaceus **26**
augur, Rhinolophus 84
aureus, Thos 101, 102
aurita, Petalia **74**, 75
banded mungoose 136
bat, big-eared 81
    free-tailed **96**
    horseshoe 81
    nose-leaf 85, 88
    yellow-winged 76
bats, fruit 70
    wrinkle-nosed 73
Bdeogale **134**, 135
    crassicauda 134, 135
    jacksoni 134, **135**
    nigripes 135
    omnivora **135**
    puisa 135, 136
bea, Thos **102**, 104, 107
beiræ, Felis 176, 177
bergeri, Hyæna **139**, 140, 141, 142
bettoni, Genetta **118**, 121
bicolor, Crocidura 65, 66
big-eared bat 81
binotata, Nandinia **120**
boranus, Elephantulus 35, **36**
    Macroscelides 36
borealis, Nycteris **93**
brachyrhynchus, Nasilio 31
Bradypus striatus 114
bweha, Thos 101, 102, 104, 106
caffer, Herpestes 126
    Hipposideros **85**, 86, 87, 88
    Rhinolophus 85
Calogale 124
    elegans 125
    maræ 125
canescens, Otocyon **111**
Canidæ 101
Canis anthus 101
    mesomelas 103
    thooides 101
    variegatus 102
capensis, Aonyx 115
    Eptesicus 92

Page.
capensis, Felis ... 176
Ictonyx ... 114
Mellivora ... 112, 114
Caracal ... 180
caracal, Lynx ... 180
Cardioderma ... 81
cor ... 81
Carnivora ... 101
cat ... 155
wild ... 155
Catolynx ... 155
Catus ... 155
catus, Felis ... 155
centralis, Hipposiderus ... 85, 86
Cercoctenus ... 28
sangi ... 29, 30
sultan ... 28, 29, 30
Chærephon ... 95, 96, 99
emini ... 97, 98, 99
hindei ... 97, 98
johorensis ... 95
limbatus ... 97, 98
naivashæ ... 96, 98
pumilus ... 95, 96
Chanler, William Astor, expedition to Tana River ... 13
cheetah ... 150
Chiroptera ... 70
chui, Felis ... 170, 171, 172, 173
cirnei, Rhynchocyon ... 28
civet, African ... 115
African palm ... 120
civetta, Viverra ... 115
Civettictis ... 115, 116
Clark, Elton, expedition to German East Africa ... 17
clawless otter ... 115
Coleura ... 72
afra ... 72
gallarum ... 72
colias, Scotophilus ... 94
colonus, Crossarchus ... 136, 137
commersonii, Hipposideros ... 88
Phyllorhina ... 88
cor, Cardioderma ... 81
Megaderma ... 81
crassicauda, Bdeogale ... 134, 135
cristatus, Proteles ... 138
Crocidura ... 41
alchemillæ ... 55, 57
allex ... 66, 67
alpina ... 67, 68
altæ ... 63, 65
amalæ ... 60
bicolor ... 65, 66
daphnia ... 42, 45, 46
doriana ... 46
elgonius ... 65, 66, 67
fischeri ... 46, 48
fisheri ... 46
fulvaster ... 47
fumosa ... 55, 56, 59, 60
gracilipes ... 63, 64, 65
hildegardeæ ... 61, 62, 63, 64, 65, 68
hindei ... 46, 48

Page.
Crocidura jacksoni ... 46, 60, 61
kempi ... 55
kijabæ ... 42, 43, 44
lakiundæ ... 53, 54
leucodon ... 41, 68
littoralis ... 69, 70
lutrella ... 46, 47, 48
lutreola ... 63, 64
maanjæ ... 62, 64
martiensseni ... 48
maurisca ... 68, 69, 70
mutesæ ... 49, 50, 51, 55
nilotica ... 51, 52, 55
nisa ... 46, 47, 48
nyansæ ... 42, 43, 44, 46, 51, 68
parvipes ... 46, 47, 48, 63
percivali ... 48, 50
planiceps ... 65, 66, 67
procera ... 63, 64
provocax ... 54
raineyi ... 55, 58, 60
roosevelti ... 41, 68
russula ... 68
schistacea ... 57, 59, 60
selina ... 57, 59
sericea ... 47
simiolus ... 49, 50, 51
suahelæ ... 49, 50, 51
sururæ ... 45, 46, 50
turba ... 51, 52, 55
umbrosa ... 59
voi ... 50
xantippe ... 50, 63
zaodon ... 51, 52, 54
Crocotta ... 143
kibonotensis ... 144
panganensis ... 144
crocuta, Crocuta ... 143
Crocuta ... 143, 146, 148
crocuta ... 143
fisi ... 145, 147, 149
germinans ... 143, 146, 148
leontiewi ... 145, 147, 149
nzoyæ ... 143, 144
rufopicta ... 145
thomasi ... 144
Crossarchus ... 134, 136
colonus ... 136, 137
fasciatus ... 136
macrurus ... 136
mungo ... 136
obscurus ... 136
Cuninghame, R. J., Smithsonian African expedition ... 15, 16
Cuon ... 163
Cynælurus guttatus ... 151, 152
Cynailurus ... 150
sœmmeringii ... 152
Cynhyæna ... 163
Cynonycteris angolensis ... 70
cystops, Rhinopoma ... 72
daphnia, Crocidura ... 42, 45, 46
delamerei, Macroscelides ... 31
Nasilio ... 31, 32
delicatus, Elephantulus ... 35, 36

Page.
dentifer, Mungos 124,128
deserti, Pipistrellus 90
dialeucos, Ichneumia 129,**131**
Mungos 131
Dieba 101
dog, hunting 103
dongalana, Genetta 117
Viverra 117
doriana, Crocidura 46
dubia, Hyæna **140**,141,142
dundasi, Elephantulus **35**
Dysopes limbatus 98
pumilus 95
Eidolon 70
helvum 70,71
elegans, Calogale 125
elephant-shrews 28
Elephantulus 29,**33**,34
boranus 35,**36**
delicatus 35,**36**
dundasi **35**
mariakanæ **33**,34,36
phæus **33**,34
pulcher **33**
rendilis **36**
rufescens **33**,34
rupestris **33**
elgonæ, Thos **103**,104,107
elgonius, Crocidura **65**,66,67
eloquens, Rhinolophus 82,84
emarginatus, Nycticeius 93
Emballonura afra 72
Emballonuridæ 72
emini, Chærephon 97,**98**,99
Nyctinomus 98
Epomophorus 71
anurus 71
gambianus 71
haldemani 71
labiatus 71
minor 71
wahlbergi 71
Eptesicus **92**
capensis 92
gracilior 92
grandidieri **93**
phasma **92**
somalicus **92**
tenuipinnis **92**
ugandæ **92**
Erinaceidæ 25
Erinaceus **25**
albiventris **26**
atratus **26**
europæus 25
hindei **26**,27
pruneri 25,**26**
sotikæ **26**
erlangeri, Genetta **119**,123
etrusca, Pachyura 41
Euhyæna 139
europæus, Erinaceus 25
exsul, Rhinolophus 81
fasciatus, Crossarchus 136
Felidæ 150

Page.
Felis **155**
beiræ 176,177
capensis 176
catus 155
chui **170**,171,172,173
fortis 172,173,**175**
hindei **175**,177
kempi 176
leo 155
massaica **155**,157,**163**,165,166,167,168,169
massaicus 155
nandæ **178**,179
nanopardus 171
nubicus 180
nyanzæ 156,**163**,166,167,168,169
ocreata 178,179
pardus 155,**170**,171
roosevelti **165**,166,168
ruwenzorii 171
sabakiensis 155,156
serval 155,176
silvestris 155
somaliensis **164**,167,169
suahelica 170,**171**,172,173
suahelicus 171
taitæ **178**,179
torquata **178**,179
ugandæ 178
venatica 150
ferox, Mungos 130
ferrumequinum, Rhinolophus 81
fischeri, Crocidura 46,48
fisheri, Crocidura 46
fisi, Crocuta **145**,147,149
forest shrews 39
fortis, Felis 172,173,**175**
fox, great-eared 111
free-tailed bat 95
frons, Lavia 76,77,80
Megaderma 77
fruit bats 70
ulvaster, Crocidura 47
fumosa, Crocidura **55**,56,59,60
funestus, Mungos **126**
fuscatus, Pipistrellus **90**,91
fuscus, Vespertilio 94
Galeopardus 155
Galerella 124
Galeriscus 134,135
jacksoni 135
gallarum, Coleura 72
gambianus, Epomophorus 71
gemmeus, Sylvisorex **39**,40
genet 116
genetta, Genetta 116
Genetta **116**,121,122
bettoni 118,121
dongalana 117
erlangeri **119**,123
genetta 116
hararensis 117
neumanni **117**,118,121
pardina 118,119
pumila 117,**120**,123
stuhlmanni **118**,119,121,122

Page.
Genetta suahelica 119, 120
    victoriæ.......................... 117
germinans, Crocuta..................... 143, 146, 148
    Hyæna..................... 143
giant jumping shrew..................... 28
gracilior, Eptesicus..................... 92
gracilipes, Crocidura..................... 63, 64, 65
gracilis, Herpestes..................... 125
grandidieri, Eptesicus..................... 93
    Vesperugo..................... 93
great-eared fox..................... 111
guttatus, Cynælurus..................... 151, 152
haldemani, Epomophorus..................... 71
    Pteropus..................... 71
hararensis, Genetta..................... 117
hedgehog..................... 25
helios, Aonyx..................... 115
    Pipistrellus..................... 90, 91
Heliosorex..................... 41
    roosevelti..................... 68
Heller, Edmund, expeditions to Africa. 14, 16, 17, 25
Helogale..................... 131, 133
    affinis..................... 132, 133
    ahlselli..................... 133, 134
    atkinsoni..................... 132, 133
    hirtula..................... 134
    lutescens..................... 134
    parvula..................... 131
    rufula..................... 132, 133
    undulata..................... 132, 134
helvum, Eidolon..................... 70, 71
helvus, Pterocyon..................... 71
    Vespertilio..................... 71
Herpestes..................... 124
    caffer..................... 126
    gracilis..................... 125
    ibeanus..................... 130
    leucura..................... 117
    robustus..................... 127
hienomelas, Hyæna..................... 140
hildebrandtii, Rhinolophus..................... 84
hildegardeae, Crocidura......... 61, 62, 63, 64, 65, 68
    Myotis..................... 89
hindei, Aonyx..................... 115
    Chærephon..................... 97, 98
    Crocidura..................... 46, 48
    Erinaceus..................... 26, 27
    Felis..................... 175, 177
    Lutra..................... 115
    Nyctinomus..................... 98
    Scotœcus..................... 94
Hipposideridæ..................... 85
Hipposideros..................... 85
    caffer..................... 85, 86, 87, 88
    commersonii..................... 88
    marungensis..................... 88
    ruber..................... 85, 86, 87, 88
    speoris..................... 85
Hipposiderus centralis..................... 85, 86
hirtula, Helogale..................... 134
hispida, Nycteris..................... 74
    Petalia..................... 74, 75
hispidus, Vespertilio..................... 74
Historical account of collection..................... 13
honey-badger..................... 112
horseshoe bat..................... 81

Page.
humeralis, Nycticeius..................... 96
hunting dog..................... 103
hyæna, Hyæna..................... 139
Hyæna..................... 139, 141, 142
    bergeri..................... 139, 140, 141, 142
    dubia..................... 140, 141, 142
    germinans..................... 143
    hienomelas..................... 140
    hyæna..................... 139
    leontiewi..................... 145
    rendilis..................... 139
    schillingsi..................... 139, 141, 142
Hyaenidæ..................... 139
hyena, spotted..................... 143
    striped..................... 139
Hyenoides..................... 103
ibeæ, Mungos..................... 126, 128
ibeana, Ichneumia..................... 129, 130, 131
ibeanus, Herpestes..................... 130
    Mungos..................... 130
Ichneumia..................... 127, 128
    albicauda..................... 127
    dialeucos..................... 129, 131
    ibeana..................... 129, 130, 131
    leucura..................... 131
Ichneumon..................... 124
ichneumon, Mungos..................... 124
Ictonyx..................... 114
    albescens..................... 114
    capensis..................... 114
    striatus..................... 114
indicus, Thos..................... 101
Insectivora..................... 25
Introduction..................... 11
irene, Sylvisorex..................... 39
jackal..................... 101
jacksoni, Bdeogale..................... 134, 135
    Crocidura..................... 46, 60, 61
    Galeriscus..................... 135
javanica, Petalia..................... 73
johorensis, Chærephon..................... 95
jubatus, Acinonyx..................... 150
jumping shrews..................... 33
kempi, Crocidura..................... 55
    Felis..................... 176
keniensis, Rhinolophus..................... 83, 84
kibonotensis, Crocotta..................... 144
kijabæ, Crocidura..................... 42, 43, 44
kuhlii, Pipistrellus..................... 90
    Scotophilus..................... 94
Kynos..................... 103
labiatus, Epomophorus..................... 71
lakiundæ, Crocidura..................... 53, 54
lasti, Mungos..................... 124
Lavia..................... 76, 78
    affinis..................... 77, 79, 80
    frons..................... 76, 77, 80
    rex..................... 76, 77, 78, 80
Leo..................... 155
leo, Felis..................... 155
Leonina..................... 156
leontiewi, Crocuta..................... 145, 147, 149
    Hyæna..................... 145
leopard..................... 155, 172, 173
Leptailurus..................... 155
lesser jumping shrew..................... 31

Page.
leucodon, Crocidura 41, 68
leucura, Herpestes 117
    Ichneumia 131
limbatus, Chærephon 97, 98
    Dysopes 98
Lindsay, Thomas P., expedition to German East Africa 17
lion 155, 166, 168
Lissonycteris 70
littoralis, Crocidura 69, 70
lixa, Pachyura 41
lobatus, Rhinolophus 83, 84
Localities, list of 19
Loring, J. Alden, member Smithsonian African expedition 14, 16
lupinus, Lycaon 109, 110
Lupulella 101
luteola, Nycteris 74
    Petalia 74, 76
lutescens, Helogale 134
Lutra hindei 115
lutrella, Crocidura 46, 47, 48
lutreola, Crocidura 63, 64
Lycaon 103
    lupinus 109, 110
    pictus 103
    somalicus 103
lynx, Lynx 180
Lynx 180
    caracal 180
    lynx 180
    nubicus 180
maanjæ, Crocidura 61, 64
Macroscelidæ 28
Macroscelides boranus 36
    delamerei 31
    rufescens 33
macrurus, Crossarchus 136
maculatus, Serval 155
maræ, Calogale 125
mariakanæ, Elephantulus 33, 34, 36
martienssenî, Crocidura 43
marungensis, Hipposideros 88
    Phyllorhina 88
massaica, Felis 155, 157, 163, 165, 166, 167, 168, 169
massaicus, Felis 155
maurisca, Crocidura 68, 69, 70
mauritianus, Taphozous 73
mcmillani, Thos 103, 105, 106, 107, 108
Mearns, Lieut. Col. Edgar A., expedition to Africa 14, 16
medicatus, Rattus 178
Megaderma cor 81
    frons 77
Megadermidæ 76
megalotis, Otocyon 111
Mellivora 112
    abyssinica 112
    capensis 112, 114
ratel 114
    sagulata 114
meneleki, Aonyx 115
mesomelas, Canis 103
    Thos 101
microphyllum, Rhinopoma 71
Miniopterus 95
    arenarius 95
    natalensis 95
    schreibersii 95
minor, Epomophorus 71
Molossidæ 95
morio, Sylvisorex 39
muishond 114
mundus, Sylvisorex 39, 40
mungo, Crossarchus 136
    Mungos 124
mungoose 124
    banded 136
    water 126
    white-tailed 127
Mungos 124, 128
    dentifer 124, 128
    dialeucos 131
    ferox 130
    funestus 126
    ibeæ 125, 128
    ibeanus 130
    ichneumon 124
    lasti 124
    mungo 124
    nepalensis 124
    ochraceus 124
    orestes 125, 128
    parvipes 124, 128
    rendilis 126, 129
    rubescens 127
    sanguineus 125
Mungotidæ 124
musk shrews 41
Mustelidæ 112
mutesæ, Crocidura 49, 50, 51, 55
myotis, Myotis 88
Myotis 88
    hildegardeæ 89
    myotis 88
naivashæ, Chærephon 96, 98
nana, Petalia 73, 75
nandæ, Felis 178, 179
Nandinia 120
    arborea 120
    binotata 120
nanopardus, Felis 171
nanus, Pipistrellus 89, 90, 91
    Vespertilio 89
Nasilio 31, 32
    albiventer 31, 32
    brachyrhynchus 31
    delamerei 31, 32
natalensis, Miniopterus 95
nepalensis, Mungos 124
neumanni, Genetta 117, 118, 121
ngorongorensis, Acinonyx 151
nigripes, Bdeogale 135
nigrita, Scotophilus 94
nilotica, Crocidura 51, 52, 55
nisa, Crocidura 46, 47, 48
noræ, Surdisorex 37, 38
nose-leaf bat 85, 88
notatus, Thos 103, 104, 107
nubicus, Felis 180

Page.
nubicus, Lynx 180
nyansæ, Crocidura 42, 43, 44, 46, 51, 68
nyanzæ, Felis 156, 163, 166, 167, 168, 169
Nycteris 74, 93
  æthiopica 74
  arge 73
  borealis 93
  hispida 74
  luteola 74
  thebaica 74
Nycticeius 93
  africanus 93
  emarginatus 93
  humeralis 93
  schlieffeni 93
Nyctinomus 99, 100
  ægyptiacus 100
  emini 98
  hindei 98
  teniotis 100
nzoyæ, Crocuta 143, 144
obscurus, Crossarchus 136
ochraceus, Mungos 124
ocreata, Felis 178, 179
omnivora, Bdeogale 125
orestes, Mungos 125, 128
orientalis, Viverra 116
Otocyon 111
  canescens 111
  megalotis 111
  virgatus 111, 113
otter, clawless 115
Oxygoüs 101
Pachyotus 94
Pachyura 41
  æquatoria 41
  etrusca 41
  lixa 41
pallidior, Proteles 138
paludinosus, Atilax 126
panganensis, Crocotta 144
Panthera 155
pardina, Genetta 118, 119
pardus, Felis 155, 170, 171
parvipes, Crocidura 46, 47, 48, 63
  Mungos 124, 128
parvula, Helogale 131
percivali, Crocidura 48, 50
perforatus, Taphozous 72, 73
Peroëchinus 26
Petalia 73, 74, 75, 76
  æthiopica 74, 76
  arge 73, 75
  aurita 74, 75
  hispida 74, 75
  javanica 73
  luteola 74, 76
  nana 73, 75
  thebaica 73
Petaliidæ 73
petersi, Rhynchocyon 28
Petrodromus sangi 29
  sultan 29
  sultani 29
phæus, Elephantulus 33, 34
phasma, Eptesicus 92
Page.
Philip, Hon. Hoffman, collection from Abyssinia 14
Phyllorhina commersonii 86
  marungensis 85
  rubra 85, 86
pictus, Lycaon 100
pipistrelle 89
pipistrellus, Pipistrellus 89
Pipistrellus 89, 91
  aero 90, 91
  deserti 90
  fuscatus 90, 91
  helios 90, 91
  kuhlii 90
  nanus 89, 90, 91
  pipistrellus 89
  rüppelii 89, 90, 91
planiceps, Crocidura 65, 66, 67
polulus, Surdisorex 27, 28
procera, Crocidura 63, 64
Proteles 138
  cristatus 138
  pallidior 138
  septentrionalis 138
  termes 138
Protelidæ 138
provocax, Crocidura 54
pruneri, Erinaceus 25, 26
Pterocyon 70
  helvus 71
Pteropidæ 70
Pteropus haldemani 71
Ptychorhina 85
pulsa, Bdeogale 125, 126
pulcher, Elephantulus 33
pumila, Genetta 117, 120, 123
pumilus, Chærephon 95, 96
  Dysopes 95
Rainey, Paul J., expedition to Africa 17
raineyi, Acinonyx 151, 152, 153, 154
  Crocidura 55, 58, 60
ratel, Mellivora 114
Rattus medicatus 178
rendallii, Vesperugo 92
rendilis, Elephantulus 36
  Hyæna 139
  Mungos 128, 129
rex, Lavia 76, 77, 78, 80
Rhinolophidæ 81
Rhinolophus 81, 82, 85
  augur 84
  caffer 85
  eloquens 82, 84
  exsul 81
  ferrumequinum 81
  hildebrandtii 84
  keniensis 83, 84
  lobatus 83, 84
  rouxi 85
  tridens 88
  zambesiensis 84
Rhinopoma 71
  cystops 72
  microphyllum 71
Rhinopomidæ 71
Rhynchocyon 28

Page.
Rhynchocyon, cirnei........................ 28
    petersi........................ 28
    usambaræ........................ 28
robustus, Athylax........................ 126
    Atilax........................ **126**, 127, 129
    Herpestes........................ 127
Roosevelt, Col. Theodore, expedition to
    Africa........................ 14, 15, 16
    Kermit, expedition to Africa.. 14, 15, 16
roosevelti, Crocidura........................ 41, 68
    Felis........................ **165**, 166, 168
    Heliosorex........................ 68
Rousettus........................ 70
    ægyptiacus........................ 70
    angolensis........................ 70
rouxi, Rhinolophus........................ 85
ruber, Hipposideros........................ 85, 86, 87, 88
rubescens, Atilax........................ **127**, 129
    Mungos........................ 127
rubra, Phyllorhina........................ 85, 86
rufescens, Elephantulus........................ **33**, 34
    Macroscelides........................ 33
rufopicta, Crocuta........................ 145
rufula, Helogale........................ **132**, 133
rupestris, Elephantulus........................ 33
rüppelii, Pipistrellus........................ **89**, 90, 91
russula, Crocidura........................ 68
ruwenzorii, Felis........................ 171
sabakiensis, Felis........................ 155, 156
sagulata, Mellivora........................ 114
sangi, Cercoctenus........................ **29**, 30
    Petrodromus........................ 29
sanguineus, Mungos........................ 125
Schaeffia........................ 101
schillingsi, Hyæna........................ **139**, 141, 142
schistacea, Crocidura........................ 57, **59**, 60
schlieffeni, Nycticeius........................ 93
schreibersii, Miniopterus........................ 95
Scotaecus albigula........................ 94
Scoteinus........................ 93
Scotœcus........................ 93
    albigula........................ **94**
    albofuscus........................ 93
    hindei........................ **94**
Scotophilus........................ **94**
    colias........................ **94**
    kuhlii........................ 94
    nigrita........................ 94
Scotozous........................ 89, 90
selina, Crocidura........................ 57, **59**
septentrionalis, Proteles........................ 138
sericea, Crocidura........................ 47
serval........................ 155, 177
    Felis........................ 155, 176
Serval........................ 155
    maculatus........................ 155
Servalina........................ 155
short-tailed shrews........................ 37
shrew, elephant........................ 28
    forest........................ 39
    giant jumping........................ 28
    jumping........................ 33
    lesser jumping........................ 31
    musk........................ 41
    short-tailed........................ 37

Page.
silvestris, Felis........................ 155
simiolus, Crocidura........................ 49, 50, 51
Smithsonian African Expedition........................ 14
sœmmeringii, Acinonyx........................ **152**
    Cynailurus........................ 152
somalicus, Eptesicus........................ **92**
    Lycaon........................ 103
    Vespertilio........................ 92
somaliensis, Felis........................ **164**, 167, 169
sorella, Sylvisorex........................ 39
sorelloides, Sylvisorex........................ 39
Soricidæ........................ 37
sotikæ, Erinaceus........................ 26
speoris, Hipposideros........................ 85
spotted hyena........................ 143
striatus, Bradypus........................ 114
    Ictonyx........................ 114
striped hyena........................ 139
stuhlmanni, Genetta........................ **118**, 119, 121, 122
suahelæ, Crocidura........................ 49, **50**, 51
suahelica, Felis........................ 170, **171**, 172, 173
    Genetta........................ 119, 120
suahelicus, Felis........................ 171
sultan, Cercoctenus........................ 28, **29**, 30
    Petrodromus........................ 29
sultani, Petrodromus........................ 29
Surdisorex........................ 37, 38
    noræ........................ 37, 38
    polulus........................ 37, 38
sururæ, Crocidura........................ 45, **46**, 50
Sylvisorex........................ **39**, 40, 65
    gemmeus........................ 39, 40
    irene........................ 39
    morio........................ 39
    mundus........................ 39, 40
    sorella........................ 39
    sorelloides........................ 39
Tadarida........................ 100
taitæ, Felis........................ 178, 179
Taphozous........................ **72**
    aegyptiacus........................ 72, 73
    mauritianus........................ 73
    perforatus........................ 72, **73**
Tarlton, Leslie J., Smithsonian African Expedition........................ 15, 16
teniotis, Nyctinomus........................ 100
tenuipinnis, Eptesicus........................ **92**
    Vesperugo........................ 92
termes, Proteles........................ **138**
thebaica, Nycteris........................ 74
    Petalia........................ 73
thomasi, Crocuta........................ 144
thooides, Canis........................ 101
Thos........................ **101**, 104, 106, 108
    adustus........................ 101, 102
    anthus........................ 101
    aureus........................ 101, 102
    bea........................ **102**, 104, 107
    bweha........................ **101**, 102, 104, 106
    elgonæ........................ **103**, 104, 107
    indicus........................ 101
    mcmillani........................ **103**, 105, 106, 107, 108
    mesomelas........................ 101
    notatus........................ **102**, 104, 107
    variegatus........................ **102**

Page.
torquata, Felis 178, 179
tridens, Asellia 88
  Rhinolophus 88
turba, Crocidura 51, 52, 55
ugandæ, Eptesicus 92
  Felis 178
umbrosa, Crocidura 59
undulata, Helogale 132, 134
Urolynchus 180
usambaræ, Rhynchocyon 28
variegatus, Canis 102
  Thos 102
velox, Acinonyx 151, 152, 153, 154
venatica, Acinonyx 150
  Felis 150
venator, Acinonyx 150
Vespertilio fuscus 94
  helvus 71
  hispidus 74
  nanus 89
  somalicus 92
Vespertilionidæ 88
Vesperugo grandidieri 93
  rendalli 92
  tenuipinnis 92
victoriæ, Genetta 117

Page.
virgatus, Otocyon 111, 113
Viverra 115
  civetta 115
  dongalana 117
  orientalis 116
  zibetha 115
Viverridæ 115
voi, Crocidura 59
von Höhnel, Lieut. Ludwig, expedition to Tana River 13
Vulpicanis 101
wagneri, Acinonyx 152
wahlbergi, Epomophorus 71
water mungoose 126
Weddell, Hon. Alexander W., collection from Zanzibar 14
White, John Jay, expedition to British East Africa 13
white-tailed mungoose 127
wild cat 155
wrinkle-nosed bats 73
xantippe, Crocidura 50, 62
yellow-winged bat 76
zambesiensis, Rhinolophus 84
zaodon, Crocidura 51, 52, 54
zibetha, Viverra 115

SMITHSONIAN INSTITUTION

UNITED STATES NATIONAL MUSEUM

Bulletin 99

EAST AFRICAN MAMMALS IN THE UNITED STATES NATIONAL MUSEUM

PART II. RODENTIA, LAGOMORPHA, AND TUBULIDENTATA

BY

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Superintendent, National Zoological Park, Washington

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

Harvard College Library
June 27, 1919.
From
United States Government.

TABLE OF CONTENTS.

Page.

Introduction 1

Summary of specimens listed in Part II 2

List of Localities 3

Order Rodentia 9

Family Sciuridæ 9

1. Heliosciurus ruwenzorii (Schwann) 10
2. Heliosciurus rufobrachiatus nyansæ (Neumann) 11
3. Heliosciurus keniæ (Neumann) 11
4. Heliosciurus undulatus undulatus (True) 11
5. Heliosciurus undulatus shindi Heller 12
6. Heliosciurus undulatus daucinus Thomas 12
7. Heliosciurus multicolor madogæ Heller 14
8. Heliosciurus multicolor lateris Thomas 14
9. Paraxerus emini emini (Stuhlmann) 14
10. Paraxerus palliatus suahelicus (Neumann) 15
11. Paraxerus ochraceus aruscensis (Pagenstecher) 15
12. Paraxerus ochraceus jacksoni (de Winton) 16
13. Paraxerus ochraceus kahari Heller 20
14. Paraxerus ochraceus animosus Dollman 20
15. Paraxerus ochraceus percivali Dollman 20
16. Protoxerus stangeri bea Heller 21
17. Xerus rutilus rufifrons Dollman 22
18. Xerus rutilus saturatus Neumann 22
19. Euxerus erythopus leucoumbrinus (Rüppell) 24
20. Euxerus lacustris (Thomas) 24
21. Euxerus microdon (Thomas) 24

Family Cricetidæ 25

22. Dipodillus watersi (de Winton) 25
23. Dipodillus stigmonyx (Heuglin) 25
24. Dipodillus diminutus Dollman 25
25. Dipodillus harwoodi harwoodi (Thomas) 27
26. Dipodillus harwoodi luteus Dollman 27
27. Taterillus emini (Thomas) 28
28. Tatera vicina vicina (Peters) 29
29. Tatera vicina pothæ Heller 29
30. Tatera vicina iconica Dollman 30
31. Tatera nigricauda nigricauda (Peters) 30
32. Tatera nigricauda nyama Dollman 31
33. Tatera nigricauda percivali Heller 31
34. Tatera liodon dundasi Wroughton 32
35. Tatera liodon smithi Wroughton 32
36. Tatera nigrita Wroughton 32
37. Tatera macropus (Heuglin) 32
38. Tatera robusta (Cretzschmar) 36
39. Tatera böhmi varia Heller 36

Order Rodentia—Continued.

Family Cricetidæ—Continued.

Page.
40. Lophiomys bozasi Oustalet 37
41. Lophiomys thomasi Heller 37
42. Lophiomys ibeanus ibeanus Thomas 38
43. Lophiomys ibeanus hindei Thomas 38
Family Rhizomyidæ 40
44. Tachyoryctes ruddi Thomas 41
45. Tachyoryctes rex Heller 41
46. Tachyoryctes spalacinus Thomas 42
47. Tachyoryctes audax Thomas 43
48. Tachyoryctes naivashæ Thomas 43
49. Tachyoryctes ibeanus Thomas 44
50. Tachyoryctes dæmon Thomas 44
51. Tachyoryctes ankoliæ Thomas 45
Family Muridæ 48
52. Dendromus insignis insignis Thomas 48
53. Dendromus insignis percivali Heller 49
54. Dendromus whytei pallescens Osgood 49
55. Dendromus whytei capitis Heller 49
56. Dendromus ruddi Wroughton 50
57. Dendromus ochropus Osgood 50
58. Dendromus acræus Wroughton 50
59. Dendromus lineatus Heller 50
60. Dendromus nigrifrons nigrifrons True 54
61. Dendromus nigrifrons spectabilis Heller 54
62. Steatomys athi Heller 55
63. Zelotomys hildegardeæ hildegardeæ (Thomas) 55
64. Zelotomys hildegardeæ vinaceus Heller 55
65. Thamnomys surdaster surdaster Thomas and Wroughton 57
66. Thamnomys surdaster polionops Osgood 58
67. Thamnomys surdaster littoralis Heller 58
68. Thamnomys ibeanus ibeanus Osgood 58
69. Thamnomys ibeanus lutosus Dollman 62
70. Thamnomys discolor Thomas 62
71. Thamnomys macmillani gazellæ Thomas 63
72. Thamnomys macmillani oblitus Osgood 63
73. Œnomys bacchante bacchante (Thomas) 64
74. Œnomys bacchante editus Thomas and Wroughton 64
75. Œnomys bacchante vallicola Heller 66
76. Rattus rattus kijabius (Allen) 68
77. Rattus nigricauda loringi (Heller) 69
78. Rattus kaiseri helleri Hollister 71
79. Rattus kaiseri medicatus (Wroughton) 71
80. Rattus kaiseri noræ (Wroughton) 72
81. Rattus kaiseri turneri (Heller) 72
82. Rattus kaiseri hindei (Thomas) 72
83. Rattus kaiseri manteufeli (Matschie) 76
84. Rattus chrysophilus voi (Osgood) 76
85. Rattus tullbergi jacksoni (de Winton) 77
86. Rattus tullbergi peromyscus (Heller) 77
87. Rattus denniæ (Thomas) 79
88. Rattus taitæ (Heller) 79
89. Rattus stella kaimosæ (Heller) 82

Order Rodentia—Continued.

Family Muridæ—Continued.

Page.
90. Rattus fumatus fumatus (Peters) 82
91. Rattus fumatus subfuscus (Osgood) 83
92. Rattus tana (True) 86
93. Rattus coucha ismailiæ (Heller) 87
94. Rattus coucha ugandæ (de Winton) 88
95. Rattus coucha tinctus Hollister 89
96. Rattus coucha neumani (Heller) 89
97. Rattus coucha panya (Heller) 89
98. Rattus coucha hildebrandtii (Peters) 94
99. Rattus coucha durumæ (Heller) 95
100. Mus triton triton (Thomas) 95
101. Mus triton murilla (Thomas) 96
102. Mus emesi Heller 96
103. Mus bellus enclavæ Heller 97
104. Mus bellus gondokoræ Heller 97
105. Mus bellus bellus (Thomas) 97
106. Mus bellus vicinus (Thomas) 97
107. Mus bellus petilus Hollister 102
108. Mus gratus gratus (Thomas) 102
109. Mus gratus soricoides Heller 103
110. Mus tenellus acholi Heller 103
111. Mus wamæ Heller 103
112. Mus musculus gentilis Brants 103
113. Cricetomys gambianus raineyi Heller 104
114. Cricetomys gambianus elgonis Thomas 104
115. Cricetomys gambianus kenyensis Osgood 104
116. Cricetomys gambianus enguvi Heller 104
117. Cricetomys gambianus osgoodi Heller 106
118. Lophuromys aquilus aquilus (True) 106
119. Lophuromys aquilus margarettæ Heller 111
120. Lophuromys ansorgei ansorgei de Winton 111
121. Lophuromys ansorgei pyrrhus Heller 112
122. Uranomys ugandæ Heller 112
123. Beamys hindei Thomas 112
124. Saccostomus mearnsi Heller 114
125. Saccostomus umbriventer Miller 114
126. Saccostomus isiolæ Heller 114
127. Acomys witherbyi de Winton 116
128. Acomys hystrella Heller 116
129. Acomys ignitus ignitus Dollman 116
130. Acomys ignitus kempi Dollman 116
131. Acomys ignitus montanus Heller 117
132. Acomys percivali Dollman 118
133. Acomys wilsoni wilsoni Thomas 118
134. Acomys wilsoni ablutus Dollman 118
135. Dasymys helukus helukus Heller 122
136. Dasymys helukus savannus Heller 122
137. Dasymys helukus nigridius Hollister 123
138. Dasymys orthos Heller 123
139. Dasymys bentleyæ medius Thomas 123

Order Rodentia—Continued.

Family Muridæ—Continued.

Page.

140. Pelomys fallax iridescens Heller 125
141. Mylomys roosevelti (Heller) 127
142. Arvicanthis testicularis testicularis (Sundevall) 128
143. Arvicanthis testicularis jebelæ Heller 128
144. Arvicanthis abyssinicus centrosus Hollister 128
145. Arvicanthis abyssinicus rubescens Wroughton 129
146. Arvicanthis abyssinicus nubilans Wroughton 129
147. Arvicanthis abyssinicus nairobæ Allen 130
148. Arvicanthis abyssinicus præceps Wroughton 130
149. Arvicanthis abyssinicus pallescens Dollman 130
150. Arvicanthis abyssinicus virescens Heller 131
151. Arvicanthis abyssinicus chanleri Dollman 131
152. Arvicanthis somalicus reptans Dollman 131
153. Lemniscomys griselda maculosus (Osgood) 136
154. Lemniscomys griselda mearnsi Heller 138
155. Lemniscomys macculus macculus (Thomas and Wroughton) 138
156. Lemniscomys striatus massaicus (Pagenstecher) 139
157. Lemniscomys striatus ardens (Thomas) 144
158. Lemniscomys barbarus zebra (Heuglin) 144
159. Lemniscomys barbarus albolineatus (Osgood) 144
160. Lemniscomys barbarus convictus (Osgood) 146
161. Rhabdomys pumilio diminutus (Thomas) 146
162. Otomys thomasi thomasi Osgood 147
163. Otomys thomasi squalus Dollman 147
164. Otomys orestes Thomas 147
165. Otomys dollmani Heller 147
166. Otomys tropicalis tropicalis Thomas 148
167. Otomys tropicalis elgonis Wroughton 148
168. Otomys angoniensis elassodon Osgood 149
169. Otomys nyikæ canescens Osgood 149
Family Graphiuridæ 152
170. Graphiurus murinus griseus Allen 152
171. Graphiurus murinus raptor Dollman 152
172. Graphiurus murinus saturatus Dollman 153
173. Graphiurus murinus isolatus Heller 153
174. Graphiurus parvus parvus (True) 154
175. Graphiurus parvus dollmani Osgood 154
176. Graphiurus personatus Heller 154
Family Pedetidæ 156
177. Pedetes surdaster surdaster Thomas 156
178. Pedetes surdaster currax Hollister 157
179. Pedetes surdaster larvalis Hollister 157
Family Bathyergidæ 159
180. Heterocephalus glaber Rüppell 160
181. Heliophobius kapiti (Heller) 161
Family Hystricidæ 162
182. Hystrix galeata Thomas 162
Family Thryonomyidæ 163
183. Thryonomys swinderianus (Temminck) 163
184. Thryonomys pusillus Heller 163
185. Thryonomys gregorianus (Thomas) 164

Page.
Order Lagomorpha........ 164
Family Leporidæ........ 164
186. Lepus isabellinus Cretzschmar........ 164
187. Lepus tigrensis Blanford........ 164
188. Lepus raineyi Heller........ 164
189. Lepus capensis abbotti Hollister........ 165
190. Lepus capensis crawshayi de Winton........ 165
191. Lepus victoriæ victoriæ Thomas........ 168
192. Lepus victoriæ kakumegæ Heller........ 169
193. Lepus microtis Heuglin........ 169
Order Tubulidentata........ 169
Family Orycteropidæ........ 169
194. Orycteropus æthiopicus Sundevall........ 170
Explanation of plates........ 171
Index........ 177

LIST OF ILLUSTRATIONS.

TEXT FIGURE.

Page.
1. Map of Africa with shaded area showing the region covered by this report.... 3

PLATES.

Facing page.
1. Map of Eastern Equatorial Africa.................................. 4
2. Lophiomys ibeanus Thomas.. 38
3–5. Pedetes surdaster surdaster Thomas.......................... 158
    Pedetes surdaster larvalis Hollister.
6–7. Heterocephalus glaber Rüppell................................. 160
8. Sciurus undulatus True=*Heliosciurus undulatus*.................. 176
9. Heliosciurus rufobrachiatus shindi Heller=*Heliosciurus undulatus shindi*.. 176
10. Heliosciurus multicolor madogæ Heller.......................... 176
    Paraxerus kahari Heller=*Paraxerus ochraceus kahari.*
11. Protoxerus stangeri bea Heller................................. 176
12. Tatera pothæ Heller=*Tatera vicina pothæ*...................... 176
    Tatera varia Heller=*Tatera böhmi varia.*
13. Tatera nigricauda percivali Heller............................. 176
14. Lophiomys thomasi Heller....................................... 176
15. Tachyoryctes rex Heller.. 176
16. Dendromus mesomelas percivali Heller=*Dendromus insignis percivali*..... 176
    Dendromus whytei capitis Heller.
    Dendromus lineatus Heller.
17. Dendromus nigrifrons True...................................... 176
    Dendromus spectabilis Heller=*Dendromus nigrifrons spectabilis.*
    Steatomys athi Heller.
18. Zelotomys hildegardeæ vinaceus Heller.......................... 176
    Thamnomys dolichurus littoralis Heller=*Thamnomys surdaster littoralis.*
19. Œnomys hypoxanthus vallicola Heller=*Œnomys bacchante vallicola*....... 176
    Epimys kaiseri centralis Heller=*Rattus kaiseri helleri.*
20. Thamnomys loringi Heller=*Rattus nigricauda loringi*............. 176
    Mus peromyscus Heller=*Rattus tullbergi peromyscus.*
21. Epimys kaiseri turneri Heller=*Rattus kaiseri turneri*........... 176
    Epimys endorobæ Heller=*Rattus dennisæ.*
    Epimys taitæ Heller=*Rattus taitæ.*
22. Epimys alleni kaimosæ Heller=*Rattus stella kaimosæ*............. 176
    Epimys niveiventris ulæ Heller=*Rattus fumatus fumatus.*
    Mus tana True=*Rattus tana.*
23. Epimys coucha ismailiæ Heller=*Rattus coucha ismailiæ*........... 176
    Rattus coucha tinctus Hollister.
    Epimys coucha neumani Heller=*Rattus coucha neumani.*
24. Epimys panya Heller=*Rattus coucha panya*........................ 176
    Epimys coucha durumæ Heller=*Rattus coucha durumæ.*
    Leggada naivashæ Heller=*Mus triton triton.*

Facing page.
25. Mus musculoides emesi Heller=*Mus emesi* 176
Mus bellus enclavæ Heller.
Mus bellus gondokoræ Heller.
Mus bellus petilus Hollister.
26. Mus gratus sungaræ Heller=*Mus gratus gratus* 176
Mus gratus soricoides Heller.
Mus tenellus acholi Heller.
Mus wamæ Heller.
27. Cricetomys gambianus raineyi Heller 176
28. Cricetomys gambianus enguvi Heller 176
29. Cricetomys gambianus osgoodi Heller 176
30. Mus aquilus True=*Lophuromys aquilus* 176
Lophuromys aquilus margarettæ Heller.
Lophuromys pyrrhus Heller=*Lophuromys ansorgei pyrrhus*.
31. Uranomys ugandæ Heller 176
Saccostomus isiolæ Heller.
Acomys hystrella Heller.
32. Saccostomus mearnsi Heller 176
Saccostomus umbriventer Miller.
33. Dasymys helukus Heller 176
Pelomys roosevelti Heller=*Mylomys roosevelti*.
34. Dasymys savannus Heller=*Dasymys helukus savannus* 176
Dasymys helukus nigridius Hollister.
Dasymys orthos Heller.
35. Pelomys fallax iridescens Heller 176
Arvicanthis jebelæ Heller=*Arvicanthis testicularis jebelæ*.
Arvicanthis abyssinicus centrosus Hollister.
36. Arvicanthis abyssinicus virescens Heller 176
Arvicanthis pulchellus micropus Heller=*Lemniscomys striatus massaicus*.
Lemniscomys pulchellus spermophilus Heller=*Lemniscomys striatus massaicus*.
37. Otomys orestes dollmani Heller=*Otomys dollmani* 176
Graphiurus murinus johnstoni Heller=*Graphiurus murinus griseus*.
Eliomys parvus True=*Graphiurus parvus*.
38. Graphiurus personatus Heller 176
Georychus kapiti Heller=*Heliophobius kapiti*.
39–40. Pedetes surdaster currax Hollister 176
41. Thryonomys gregorianus pusillus Heller=*Thryonomys pusillus* 176
42. Lepus raineyi Heller 176
43. Lepus capensis abbotti Hollister 176
44. Lepus kakumegæ Heller=*Lepus victoriæ kakumegæ* 176

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PART II. RODENTIA, LAGOMORPHA, AND TUBULIDENTATA.

By N. HOLLISTER,
Superintendent, National Zoological Park, Washington.

INTRODUCTION.

The first part of this work, published August 16, 1918, dealt with the mammals of the orders Insectivora, Chiroptera, and Carnivora contained in the East African collections of the United States National Museum. This second part consists of reports on the specimens belonging to the Orders Rodentia (rodents), Lagomorpha (hares and their allies), and Tubulidentata (aard-varks). It is hoped that a third part, containing reports on the primates and ungulates, may complete the series.

The plan of arrangement of the text adopted in the first part has been followed throughout, and the geographical limits are the same. All specimens of mammals from Eritrea, Somaliland, Sudan, Abyssinia, Lado Enclave, Uganda, British East Africa, and German East Africa, including Zanzibar, contained in the collection have been critically examined and listed. The territory included in the report is shown in figure 1.

As with the groups treated in the earlier part, the great bulk of the material listed was collected by the Smithsonian African Expedition under the direction of Col. Theodore Roosevelt, 1909–10; and by the Paul J. Rainey African Expedition, 1911–12. A few specimens, some of special importance, have been received from miscellaneous sources as noted in the summary below.

SUMMARY OF SPECIMENS LISTED IN PART 2.

The mammals of the orders Rodentia, Lagomorpha, and Tubulidentata, listed in these pages, were received by the museum from expeditions and collectors as follows:

	Rodentia.	Lagomorpha.	Tubulidentata.	Total.
Smithsonian African Expedition under the direction of Col. Theodore Roosevelt:				
Col. Theodore Roosevelt	8			8
Kermit Roosevelt	4			4
Lieut. Col. Edgar A. Mearns, U. S. A	335	14		349
Edmund Heller	244	5		249
J. Alden Loring	2,112	23		2,135
R. J. Cuninghame	2			2
Paul J. Rainey African Expedition:				
Edmund Heller	1,979	14		1,993
A. J. Klein	2			2
A. B. Percival	19			19
H. J. A. Turner	2			2
Dr. W. L. Abbott	43	2		45
A. B. Percival	16			16
Hon. N. Charles Rothschild	9	2		11
H. J. A. Turner	9			9
W. F. H. Rosenberg (received from)	2	2		4
G. H. Goldfinch	2			2
W. G. Doggett	2			2
R. E. Dent	2			2
William Astor Chanler and Lieut. Ludwig von Höhnel	2			2
William Astor Chanler	1			1
Hon. Hoffman Philip			1	1
Capt. V. Bottego	1			1
D. Carruthers	1			1
Dr. V. Ragazzi	1			1
G. Denhardt	1			1
W. Schlüter (received from)	1			1
	4,800	62	1	4,863

SUMMARY.

From Smithsonian African Expedition	2,747
From Paul J. Rainey Expedition	2,016
From miscellaneous sources	100
Total rodents, lagomorphs, and tubulidentates in the United States National Museum East African collection	4,863

There are included in the East African collections of these groups 75 type-specimens of rodents and 3 type-specimens of lagomorphs. Of the 78 new forms 1 was described by Gerrit S. Miller, jr., 5 by Dr. F. W. True, 8 by N. Hollister, and 64 by Edmund Heller.

Of these 78 described forms, 71 are recognized as valid species or subspecies in the present paper.

In the previous part there were listed 1,833 insectivores, bats, and carnivores. This makes a total of 6,696 specimens of mammals, of 349 species and subspecies, belonging to the six orders dealt with to date in this report on the East African collections, including 142 type-specimens.

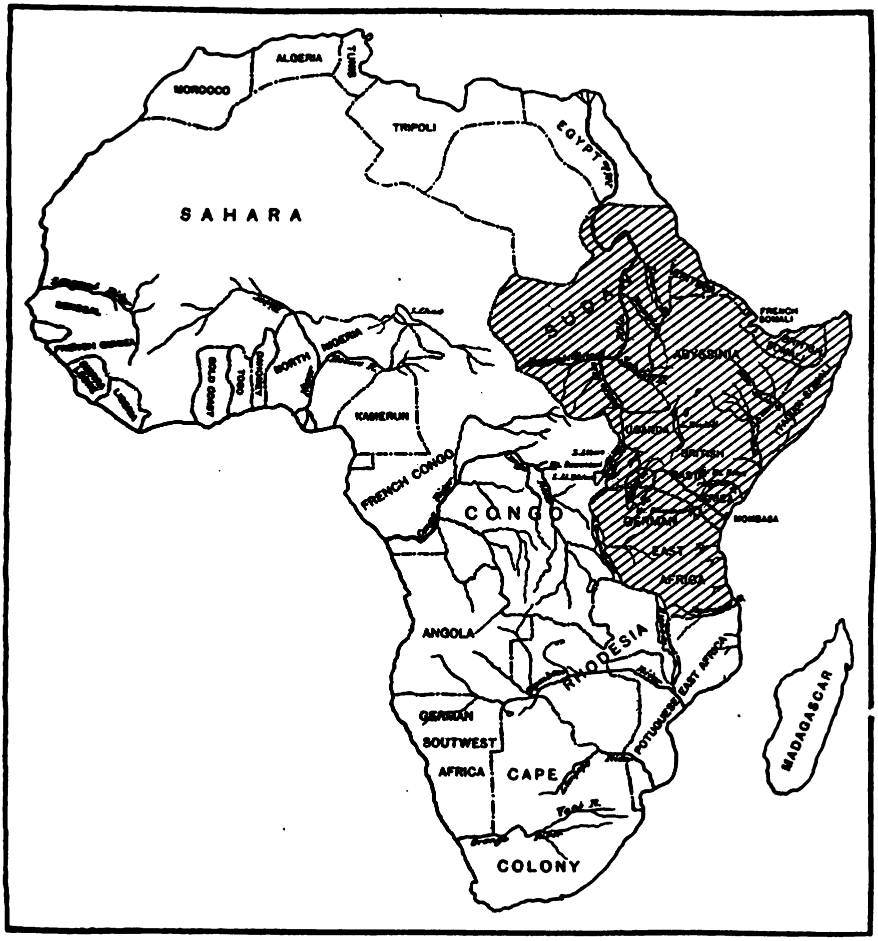


FIG. 1.—MAP OF AFRICA WITH SHADED AREA SHOWING THE REGION COVERED BY THIS REPORT.

LIST OF LOCALITIES.

A list of all the localities from which National Museum specimens of mammals of the orders Rodentia, Lagomorpha, and Tubulidentata are mentioned in this report is given below, with index references to the accompanying map, reproduced from Part I. As explained in the introduction to the first part, maps of this region do not agree in essential details and it has been impossible to determine some of the localities with precision; but there has rarely been any doubt about the approximate location of a given place and the variations can be only of a comparatively few miles at the most.

Aberdare Mountains—A range of mountains about half way between Lake Naivasha and Mount Kenia. Summits said to be 11,000–12,000 feet. J 4.

Adis Ababa—Capital city of Abyssinia, situated near the geographical center of that country. Also written Addis Ababa and Addis Abeba. F 5.

Agordat—In central Eritrea, near the southern bank of the big bend of the Barca River. C–D 4–5.

Ankole—District in extreme southwestern Uganda just east of Albert Edward Nyanza. J 2.

Archer's Post—On the Northern Guaso Nyiro near the mouth of the Lakiundu River, north of Mount Kenia. I 5.

Athi Plains—North and east of Nairobi. J 4.

Athi Station—On the Uganda railway, 16 miles southeast of Nairobi. It is also called Athi River. Altitude 4,950 feet. J 4.

Bargunett River, or Burgunett River—A southern tributary of the Northern Guaso Nyiro, near the Meru Road, west of Mount Kenia. J 4.

Burumba—In Ankole, southwestern Uganda. J 2.

Butiaba—On the northeast shore of Albert Nyanza in Unyoro, Uganda. I 2.

Changamwe—Station on the railroad 6 miles inland from Mombasa. Altitude 180 feet. K 5.

Changongorra—On the east side of the Aberdare Range 9 miles from Nyeri; also called Kongorra. J 4.

Chanler Falls—On the Northern Guaso Nyiro River north of the Jambeni Mountains and east of Archer's Post. I 5.

Deep Dale—Between the Engare Narok River and Suswa Plain, southwestern British East Africa. J 4.

Eldoma Ravine—Just north of the Equator and north from the railroad station of Londiana, British East Africa; the Eldoma River flows into the Molo, which empties into Lake Baringo. I–J 4.

Engare Narok River—A tributary of the Southern Guaso Nyiro. On the west side of the Mau Escarpment midway between the Uganda railroad and the border of German East Africa. Also writtern Engarro Naroke, or N'garri Narok. J 4.

Engare Ndare River—A southern tributary of the Northern Guaso Nyiro, north of Mount Kenia. I 4.

Fort Hall—About midway between Nairobi and Mount Kenia. J 4.

Gondokoro—On the east bank of the Bahr el Jebel in extreme northwestern Uganda. H 2.

Guas Ngishu Boma—At the eastern edge of the Guas Ngishu Plateau near the Elgeyo Escarpment and north of Ravine Station. I 4.

Guas Ngishu Plateau.—South and east of Mount Elgon, west of the Elgeyo Escarpment, and north of the Nandi Hills. Drained by the upper waters of the Nzoia River. I 3–4.

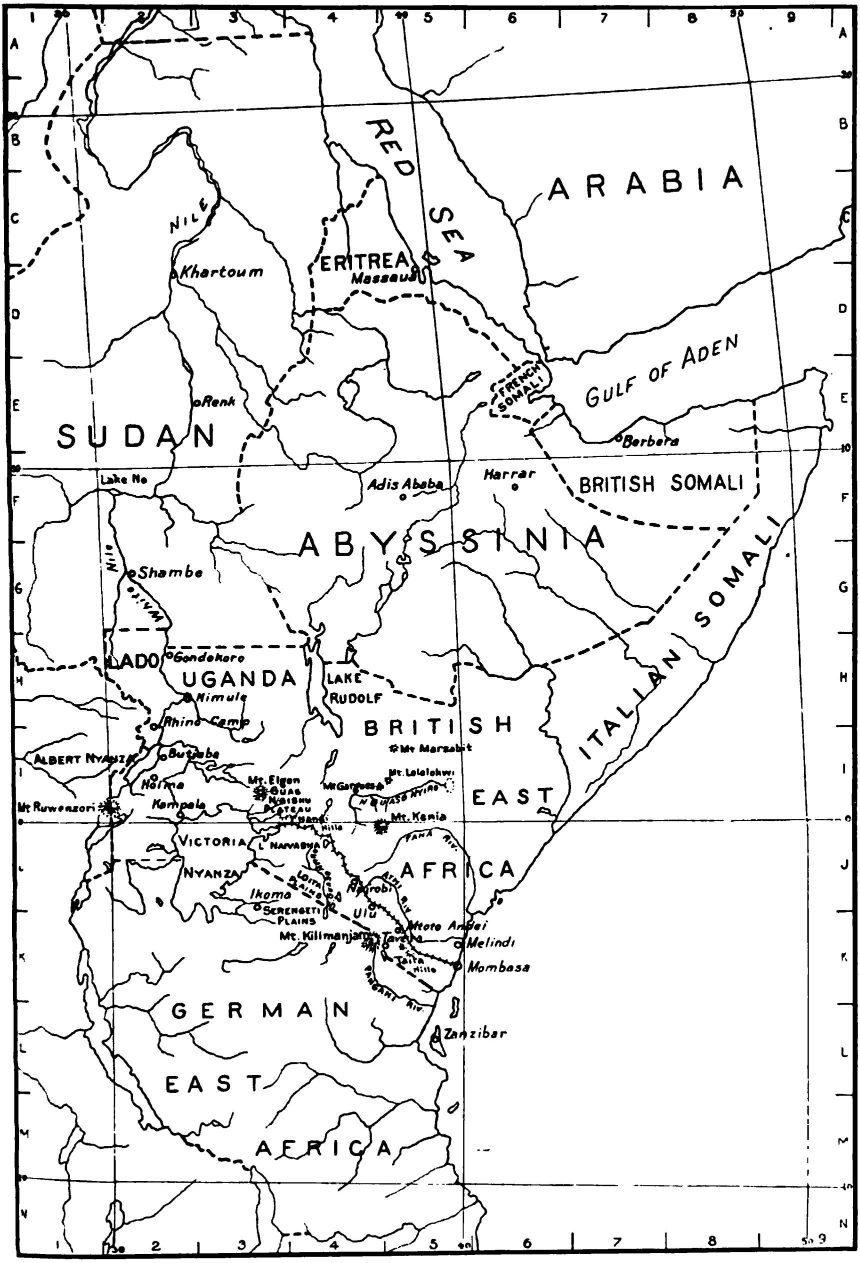
Hoima, or Fort Hoima—In Unyora, western Uganda, not far from the eastern shore of Albert Nyanza. I 2.

Isiola River—A southern affluent of the Northern Guaso Nyiro north of Mount Kenia, and west from the Lakiundu River. I 4–5.

Jambeni Mountains—Northeast of Mount Kenia about half way to the Northern Guaso Nyiro River. I 5.

Juja Farm—W. N. McMillan's place on the Athi Plains, about 23 miles northeast of Nairobi. J 4.

Kabalolot Hill—In the Sotik, west of Loita Plains and near the border of German East Africa. Headwaters of the Amala River. J 3–4.



MAP OF EASTERN EQUATORIAL AFRICA.

FOR EXPLANATION OF PLATE SEE PAGE 3.

Kabula Muliro—On the road about midway between Kampala and Hoima, Uganda; between Albert Nyanza and Victoria Nyanza. I 2.

Kahe—About 45 miles southeast of Mount Kilimanjaro, in German East Africa, east of the Pangani River. K 4–5.

Kaimosi—On the Lukosa River just north of the Equator and north of Port Florence, the western terminus of the railway in Kavirondo. I 3.

Kajuia—Near the east shore of Albert Nyanza, south of Butiaba in Unyoro. I 2.

Kakumega—Just north of the Equator near Port Florence, the end of the railway in Kavirondo, Kisumu Province, northeast of Victoria Nyanza. I 3.

Kamiti Farm—Ranch owned by H. H. Heatley on the Athi Plains. J 4.

Kampala—Fort Kampala, or Mengo, just north of Entebbe, Uganda, and near the northwestern edge of Victoria Nyanza. I 2.

Kapiti, or **Kapiti Plains**—A station, also called Kapiti Station, on the railway 29 miles southeast of Nairobi and 288 miles from Mombasa. Altitude, 5,350 feet. J 4.

Kara Water, or **Kara River**—On the Marsabit Road north of Mount Lololokwi. I 5.

Kenya Water—On the Marsabit Road north of the Northern Guaso Nyiro toward Mount Marsabit. I 5.

Kerma—On the eastern bank of the Nile in northwestern Sudan. B 1–2.

Khartoum—On the White Nile in Sudan. D 2.

Kiambu—In Kikuyu, British East Africa, north of Nairobi and near the western edge of the Athi Plains. J 4.

Kibabe—In the Nandi Hills, Kisumu Province, British East Africa, just north of the Equator and northeast from Victoria Nyanza. I 3.

Kijabe—A station on the Uganda railway in British East Africa between Nairobi and Lake Naivasha. Altitude, 6,790 feet. J 4.

Kikanda—See Kikonda. I 2.

Kikandwa—About 20 miles northwest from Kampala, north of Victoria Nyanza, Uganda. I 2.

Kikonda—About 25 miles southeast of Hoima, Unyoro, Uganda. I 2.

Kikuyu—A station on the railway between Nairobi and Kijabe, in Kikuyu, British East Africa. J 4.

Kilimanjaro—See Mount Kilimanjaro. K 4.

Kisimbiri—North of Kampala and Entebbe, near the northwest corner of Victoria Nyanza, Uganda. Sometimes written Kisimbili. I 2.

Kisingo—About midway between Kampala and Hoima, Uganda. I 2.

Kisumu—A village on Ugowe Bay, northeastern shore of Victoria Nyanza and near Port Florence. Also a province of western British East Africa bordering on Victoria Nyanza. J 3.

Kitanga—Sir Alfred Pease's farm in the Mwa Hills on the Athi Plains, near Nairobi and Athi Station. J 4.

Kongorra—See Changongorra. J 4.

Kurseine—On the Northern Guaso Nyiro above the mouth of the Guaso Narok. I 4.

Kyambu—See Kiambu. J 4.

Lagos—Near Ledgus, on the east side of the Bahr el Jebel, between Gondokoro and Nimule, northwestern Uganda. H 2–3.

Laikipia—On the western edge of the Laikipia Plateau southeast of Lake Baringo. I 4.

Laikipia Plateau—Northwest from Mount Kenia and north of the Aberdare Mountains. I 4.

Lake Naivasha—A lake and station on the railway across British East Africa, 391 miles from Mombasa and almost 200 miles from Port Florence. The altitude of the railway station is given as 6,230 feet. J 4.

Lakiundu River—Rises in the Jambeni Mountains, northeast of Mount Kenia, and flows west and north into the Northern Guaso Nyiro at Archer's Post. I 5.

Ledgus—On the east bank of the Bahr el Jebel, between Gondokoro and Nimule, northwestern Uganda. H 2–3.

Lesiweru River—One of the numerous small streams flowing northwest from Mount Kenia and crossed by the Meru road. I 4.

Let Marefia—Northeast from Adis Ababa, Abyssinia. F 5.

Lialo—Northwest from Kisingo, about midway between Kampala and Hoima, Uganda. I 2.

Lime Springs—Near the eastern edge of the Loita Plains, not far from the Southern Guaso Nyiro River. J 4.

Loita Plains—Near the German East African border in southwestern British East Africa, west of the Rift Valley and the Southern Guaso Nyiro River. J 4.

Lombeki River—Eastern tributary of the Bahr el Jebel between Uma village and Nimule, Uganda. H 2.

Londiana—Station on the Uganda Railway in western British East Africa between Nakuro and Port Florence; 500 miles from Mombasa and 84 miles from Port Florence. Altitude, 7,410 feet. I–J 3–4.

Longaya Water—On the Marsabit Road north of Mount Lololokwi. Also written Lungaya. I 5.

Lorian Swamp—About 160 miles northeast of Mount Kenia. Shown on maps as the eastern limit of the Northern Guaso Nyiro River. I 5.

Loroghi Mountains—About midway between Mount Kenia and the southern end of Lake Rudolf. I 4.

Lugh—On the Ganale River in western Italian Somaliland, near the boundary line between Abyssinia and British East Africa. H 6.

Lukenia Hills—See Ulukenia Hills. J 4.

Lukosa River—South of the Nzoia River on Guas Ngishu Plateau, flowing into Victoria Nyanza. Also called Lukos River and Yala River. I 3.

Machorra—In the Taita Hills. Sometimes written Macharra. K 5.

Maji-ya-chumvi—A station on the railroad 35 miles from Mombasa; altitude, 570 feet. K 5.

Marangu—On the southeastern side of Mount Kilimanjaro in German East Africa, near the boundary line of British East Africa. K 4.

Mariakani—A station on the railroad 26 miles from Mombasa. K 5.

Marsabit Lake—At Mount Marsabit, north of the Northern Guaso Nyiro. I 5.

Marsabit Road—The route to Mount Marsabit, north of the Northern Guaso Nyiro. I 5.

Mayo River—Rises in the Aberdare Mountains and flows into the Nyuki River, one of the affluent streams of the Northern Guaso Nyiro. J 4.

Mazeras—Station on the railroad 16 miles from Mombasa; altitude 530 feet. K 5.

Merelle River, or Merelle Water—On the Marsabit Road about midway between the Northern Guaso Nyiro River and Mount Marsabit. Sometimes written Merele. I 5.

Merowe—On the Nile in north central Sudan between Ambukol and Salmia. B–C 2.

Meru, or Meru Boma—Just north of Mount Kenia. I–J 4–5.

Meru Road—Across the Laikipia Plateau to Meru, north of Kenia. I–J 4.

Mission—The Friends Industrial Mission at Kaimosi, Kisumu, Kavirondo. I 3.

Mnyouri Jardin—On the east bank of the Bahr el Jebel, between Gondokoro and Nimule, and just south of Ledgus, northwest Uganda. H 2.

Mobuku Valley—Southeast side of Mount Ruwenzori, between Albert Nyanza and Albert Edward Nyanza, western Uganda. I 1–2.

Mount Gargues—In the Mathews Range, north of Mount Kenia and southeast of Lake Rudolf. Summit said to be 8,800 feet altitude. Also written Mount Uarages. I 4–5.

Mount Kenia—A high peak in central British East Africa, almost directly on the Equator. Altitude given on recent maps from 17,200 feet to 18,620 feet. Timber line is about 13,000 feet. I-J 4-5.

Mount Kilimanjaro—A mountain on the border between British East Africa and German East Africa, about 175 miles from the coast. Altitude 19,780 feet. K 4.

Mount Lololokwi—An isolated mountain east of the Mathews Range, about midway between Mount Kenia and Mount Marsabit, British East Africa. I 4-5.

Mount Marsabit—In northern British East Africa, about 170 miles north of Mount Kenia. I 5.

Mount Mbololo—In the Taita Hills, about midway between Kilimanjaro and the coast. Summit 4,400 feet. Sometimes written Mbululu, or Umbololo. K 5.

Mount Nyiro—A short distance south of Lake Rudolf and northeast of Lake Sugota. I 4.

Mount Sagalla—In the southern Taita Hills, about midway in a line between Kilimanjaro and Mombasa. K 5.

Mount Uaragess—See Mount Gargues. I 4-5.

Mount Umengo—In the Taita Hills, west of Ndi, and between Taveta and the railway, British East Africa. K 5.

Mtoto Andei—A station on the railway 165 miles inland from the coast and about midway between Mombasa and Nairobi. Altitude 2,500 feet. K 5.

Mubuku Valley—See Mobuku Valley. I 1-2.

Naikhala—On the east bank of the Atbara River a short distance above Atbara Station where it empties into the Nile, north central Sudan. C 3.

Nairobi—Capital of Ukamba Province, British East Africa, 327 miles from Mombasa and about 260 miles from Port Florence by rail. Altitude, 5,450 feet. J 4.

Naivasha—A station on the Uganda railway near Lake Naivasha. Altitude, 6,230 feet. J 4.

Naivasha Escarpment—The forested escarpment east and northeast of Lake Naivasha, between the railroad and the true Naivasha Plains. J 4.

Naivasha Plains—West, northwest, and northeast of Lake Naivasha; particularly the plains between the Naivasha Escarpment and the Aberdare Mountains. J 4.

Naivasha Station—See Naivasha and Lake Naivasha. J 4.

Nakheila—Same as Naikhala. C 3.

Nakuru, or **Nakuro**—Station and lake on the railroad in British East Africa, about 55 miles west of Naivasha. The altitude of the station is 5,950 feet. J 4.

Narosurra River—Flows from the Loita Plains into the Southern Guaso Nyiro. Also called Narossera. J 4.

Ndi—In the Taita Hills, between Taveta and the railroad. K 5.

Neuman's Boma—On the north bank of the Northern Guaso Nyiro River nearly opposite the mouth of the Isiola. Also called Neuman's Camp. Almost directly north from Mount Kenia, about 60 miles. I 4-5.

Ngare Ndare River—See Engare Ndare River. I 4.

Ngare Nyuki or **Nyuki River**—One of the headwaters of the Northern Guaso Nyiro, northwest of Mount Kenia. Sometimes written Nyuku. I 4.

Nimule—On the east bank of the Bahr el Jebel, about midway between Albert Nyanza and the Sudan border, in northwestern Uganda. H 2.

Njoro O Nyiro River—West side of the Mau Escarpment, about 35 miles southwest of Lake Naivasha. Sometimes given as Oljoro O Nyon River. J 4.

Njoro Osolali, or **Njoro O Solali**—In the Sotik, southwestern British East Africa. J 4.

Nkyanuna—A few miles northwest from Fort Kampala, Uganda, on the trail to Hoima. I 2.

North Creek—On the northern slopes of Mount Gargues, Mathews Range, British East Africa. I 4-5.

Northern Guaso Nyiro—The region of the Northern Guaso Nyiro River, north of Mount Kenia. I 4–5.

Northern Guaso Nyiro River—Formed by numerous streams in the Aberdares, northern slopes of Mount Kenia, and Mathews Range; and flowing eastward at least to the Lorian Swamp. I 4–5.

Nyangnori—In the Nandi Hills, a short distance northeast from Port Florence, British East Africa. I–J 3.

Nyeri—On the southwestern side of Mount Kenia at 6,200 feet. J 4.

Nyuki River—See Ngare Nyuki. I 4.

Nzoia River—Drains the Guas Ngishu Plateau and empties into Victoria Nyanza a few miles north of the Equator. I 3.

Oljoro O Nyon River—West side of the Mau Escarpment about 35 miles southwest of Lake Naivasha. See Njoro O Nyiro. J 4.

Omboni River—One of the headwaters of the Tana, south of Mount Kenia. Also called Oni River. J 4–5.

Oni—See Omboni River. J 4–5.

Orr Valley—At Mount Nyiro, near the southern end of Lake Rudolf. I 4.

Quoy, or Quoy Water—On the Marsabit Road northeast from Mount Lololokwi. I 5.

Ravine, Ravine Boma, or Ravine Station—On Eldoma River a short distance north of the Equator in western British East Africa; north of the railway station of Londiana. I–J 4.

Rhino Camp—Colonel Roosevelt's base camp on the west bank of the Nile in extreme southern Lado Enclave at 2° 55′ north. H–I 2.

Ruwenzori East—Eastern slopes of Mount Ruwenzori. I 2.

Ruwenzori Mountains—In extreme western Uganda just north of Albert Edward Nyanza; rise to an altitude of about 20,000 feet. I 1–2.

Saba Saba—Between Nairobi and Mount Kenia, a few miles southwest of Fort Hall. J 4–5.

Salt Marsh—Near the eastern edge of the Loita Plains, near Lime Springs, Sotik. J 4.

Salt River—South of the Northern Guaso Nyiro River, east of Chanler Falls. I 5.

Sandai—On the Northern Guaso Nyiro, 10 miles above Archer's Post. I 4–5.

Shereik—On the east bank of the Nile in north central Sudan. B–C 2–3.

Sibi River—East of the Engare Narok, in the Southern Guaso Nyiro. J 4.

Sir Alfred Pease's Farm—See Kitanga. J 4.

Sirgoit—Near the Elgeyo Escarpment, eastern edge of Guas Ngishu Plateau. I 4.

Sirgoit Lake—Near the Elgeyo Escarpment, eastern edge of Guas Ngishu Plateau, northwest from Sirgoit. I 4.

Sotik—District in southwestern British East Africa between the Mau Escarpment and Kavirondo Bay. J 3–4.

Southern Guaso Nyiro—Region of the Southern Guaso Nyiro River, southwestern British East Africa. J 4.

Southern Guaso Nyiro River—Southwestern British East Africa and northern German East Africa on the west side of the Rift Valley. J 4.

Suswa Plain—South of Lake Naivasha and west of Kikuyu. J 4.

Taita Hills, or Taita Mountains—About midway between Kilimanjaro and the coast in southeastern British East Africa. K 5.

Tana River—Heads in the Aberdares and southern side of Kenia and flows into the Indian Ocean something over 100 miles north of Mombasa. J 5.

Taveta—In British East Africa near the German East African border southeast of Mount Kilimanjaro. K 4–5.

Telek River—North of Loita Plains in southwestern British East Africa. J 3–4.

Thika River—One of the affluents of the Tana River south of Mount Kenia. J 5.

TSAVO—Station where the railroad in British East Africa is crossed by the Tsavo River; southeast of Mtoto Andei and 133 miles from Mombasa. Altitude 1,530 feet. K 5.

TURAH WATER—Tributary to the upper Northern Guaso Nyiro, northwest of Mount Kenia. I 4.

ULUKENIA HILLS—On the Athi Plains east of Nairobi. Also written Ulucania or Lukenia. J 4.

UMA—A village on the east bank of the Bahr el Jebel just north of Nimule, Uganda. H 2.

USERI RIVER—Fifteen miles east of Kilimanjaro, in British East Africa. K 5.

VOI—Station on the railway 103 miles northwest from Mombasa. Altitude 1,830 feet. K 5.

VOI RIVER—Crosses the railway at Voi station, 100 miles from Mombasa, and flows into the Indian Ocean between Melinda and Mombasa. Also called Muhowa, or Muho wa Mangudo. K 5.

WAMBUGU—Between Fort Hall and Mount Kenia at 5,300 feet altitude. J 4–5.

WANGE—On the coast of British East Africa about 50 miles north of the mouth of the Tana River. J 6.

WEST KENIA FOREST STATION—A forest station on the west side of Mount Kenia at 7,500 feet altitude. I–J 4–5.

YALA RIVER—See Lukosa River. I 3.

ZANZIBAR—Town on Zanzibar Island. L 5.

The arrangement of the families of rodents follows the outline given by Miller and Gidley.[1] The plates illustrate the skulls of all type-specimens of mammals of the orders included in this part which are in the museum. Three type-specimens (*Lemniscomys dorsalis mearnsi*, *Acomys ignitus montanus*, and *Graphiurus murinus isolatus*) are skins only and consequently are not figured. Of the 75 type skulls 57 are here figured for the first time.

Order RODENTIA.

Family SCIURIDÆ.

Genus HELIOSCIURUS Trouessart.

1880. *Heliosciurus* TROUESSART, Naturaliste, vol. 2, p. 292. October. (*H. gambianus*.[2])

1909. *Sciurus* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 3, p. 469. June. (Part; not of Linnæus.)

1916. *Æthosciurus* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 17, p. 271, March. (*H. poensis*.) [Valid as a subgenus.]

In a revision of the genera of African squirrels published by Thomas in 1909,[3] three African species were provisionally referred to *Sciurus*, chiefly because of the presence in each of the small pm^3, usually absent in *Heliosciurus*. No other characters are given to distinguish *Heliosciurus* from *Sciurus* in the diagnoses and key, and *Heliosciurus* is said to possess "molars of typical *Sciurus* structure." Later these three African species were removed by Thomas[1] from *Sciurus* on the character of the baculum alone, and placed in a new genus, *Æthosciurus*, further distinguished from *Heliosciurus* by the presence of two upper premolars.

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[1] Synopsis of the supergeneric groups of Rodents, Journ. Washington Acad. Sci., vol. 8, pp. 431–448, July 19, 1918.

[2] See Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 3, p. 470. June, 1909.

[3] The Generic Arrangement of the African Squirrels, Ann. and Mag. Nat. Hist., ser. 8, vol. 3, pp. 467–475, June, 1909.

Comparison of the teeth of *Sciurus vulgaris* with those of *Heliosciurus* and those of the African species referred to *Sciurus* (and later to *Æthosciurus*) shows that all these African species are closely related and that all differ considerably from true *Sciurus*. Specimens of "*Æthosciurus*" *poensis* and "*A*" *ruwenzorii* agree in all essential details of dental structure with *Heliosciurus*, and these all differ considerably from *Sciurus vulgaris*. The lower molars, both in *Heliosciurus* and *Æthosciurus*, are more complex, with definite transverse ridge across forward part of crown which isolates a narrow valley anterior to the central basin. The transverse ridges of the upper molars of *Sciurus* are nearly parallel, while in the African species these ridges are strongly convergent on inner side, and there is always present a slightly developed hypocone. These structural peculiarities of the molars are of so much more importance than the presence or absence of a small spike-like upper premolar that it is obvious the African species referred to *Æthosciurus* are in reality closely related to *Heliosciurus* and well removed from *Sciurus*. The two African species of *Æthosciurus* that I have seen (I have not seen *A. lucifer*) are closely related, as shown by their peculiar coloration and the presence of the functional pm^3, and should on this account form a subgenus of *Heliosciurus*. In view of the very close relationship to true *Heliosciurus* and the fact that specimens of the latter sometimes exhibit spike-like small upper premolars it would hardly seem proper to recognize *Æthosciurus* as a full genus.

For measurements of specimens of the squirrels of this genus, see page 13.

HELIOSCIURUS RUWENZORII (Schwann.)

1904. *Sciurus rufobrachiatus ruwenzorii* SCHWANN, Ann. and Mag. Nat. Hist., ser. 7, vol. 13, p. 71. January. (Wimi, or Luimi, Valley, Ruwenzori, Uganda; type in British Museum.)

1910. *Sciurus ruwenzorii* THOMAS AND WROUGHTON, Trans. Zool. Soc. London, vol. 19, p. 497. March.

Specimen.—One, from—

UGANDA: Mubuku Valley, Mount Ruwenzori (Carruthers).

The members of the Ruwenzori Expedition found this squirrel "plentiful on Ruwenzori from 6,500 feet up to 8,500 feet, the boundaries of the forest-zone"[2] A geographical race has since been described from Vulcan Forest, north of Lake Kivu.[3]

This species is a member of the subgenus *Æthosciurus*.

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 17, p. 271. March, 1916.

[2] Thomas and Wroughton, Trans. Zool. Soc. London, vol. 19, p. 497, March, 1910.

[3] *Sciurus ruwenzorii vulcanius* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 476, November, 1909.

HELIOSCIURUS RUFOBRACHIATUS NYANSÆ (Neumann).

1902. *Sciurus nyansae* NEUMANN, Sitz.-ber. Ges. nat. Freunde Berlin, 1902, p. 56. (Kwa Kitoto, Kavirondo [Kisumu], British East Africa; type in Berlin Museum.)

Specimens.—Eighteen, from localities as follows:

BRITISH EAST AFRICA: Kaimosi, 14 (Heller); Lukosa River, 4 (Heller).

Included in the Kaimosi series are small young without cheek teeth, taken January 26 and 30; and half-grown young collected February 4. The adults, collected in late January and early February, are mostly in full fresh pelage, but a few show very nicely the process of renewal. One collected January 28 has the anterior half, above and below, with the exception of a narrow band across the occiput, in fresh coat. There is considerable variation in the color of the feet in the Kaimosi series—from ochraceous orange to bright chestnut. When the extremes in color are brought together the difference is very striking.

HELIOSCIURUS KENIÆ (Neumann).

1902. *Sciurus keniae* NEUMANN, Sitz.-ber. Ges. nat. Freunde Berlin, 1902, p. 176. (West side of Mount Kenia, British East Africa, at 8,000 feet; type in British Museum.)

1910. *Heliosciurus keniæ* ROOSEVELT, African Game Trails, Amer. ed., pp. 472, 476; London ed., pp. 484, 488.[1]

Specimen.—One, from—

BRITISH EAST AFRICA: West slope Mount Kenia at 7,000 feet (Heller).

This specimen, an old female, has the characteristic blotch of white on the underside of the neck, to between the forelegs. The hands and feet are colored like the back, with no indication of rufous or ochraceous beyond the pale ochraceous buff speckling of the hair tips. The species is a member of the *rufobrachiatus* group, but I am not aware that any specimens have been taken to prove intergradation with *H. r. nyansæ.*

HELIOSCIURUS UNDULATUS UNDULATUS (True).

Plate 8.

1892. *Sciurus undulatus* TRUE, Proc. U. S. Nat. Mus., vol. 15, p. 465, fig. 3. (Mount Kilimanjaro, British East Africa, at 6,000 feet; type in U. S. Nat. Mus.)

1909. *Sciurus undulatus* LYON AND OSGOOD, Bull. 62, U. S. Nat. Mus., p. 196. January 28.

1911. *Heliosciurus undulatus marwitzi* MÜLLER, Zool. Anz., vol. 37, p. 82. January. (Mount Kilimanjaro; type in Berlin Museum.)

1914. *Heliosciurus rufobrachiatus undulatus* HELLER, Smithsonian Misc. Coll., vol. 63, No. 7, p. 7. June 24.

Specimens.—Two, as follows:

BRITISH EAST AFRICA: Mount Kilimanjaro, 6,000 feet, 1 (Abbott).

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[1] Since this manuscript was prepared there has appeared a popular edition of "African Game Trails" in which the pagination is entirely different from that of the original edition. The references cited throughout this list are from the original American and London editions, published in 1910. The later popular edition is without title-page date.

German East Africa: Kahe, 1 (Abbott).

The type-specimen is conspicuous among East African squirrels for its luxuriant, soft coat. It was collected at 6,000 feet altitude on June 12. The upper tooth rows each have a very small and imperfect *pm*¹, broken on the left side. This tooth is not functional and is in no way comparable to the small premolar regularly present in *Æthosciurus*. The large premolar has the anterior cusp developed as in *Heliosciurus*, and there can be no doubt that the species belongs in that genus. The female specimen from Kahe, German East Africa, included by True in the original description, is so different in some respects from the type that I am somewhat doubtful as to its belonging with this subspecies. It is very much shorter haired and the hair-rings on the upperparts are much brighter ochraceous buff than in the type; the skull differs from the type skull in its much broader rostrum, in this respect resembling the subspecies *daucinus* and *shindi*. The specimen was collected in September and is therefore not comparable with the type as to pelage; and with only the single skull it would be unwise to consider the specimen subspecifically distinct on the character of the broader rostrum. After a very careful study of the description of *Heliosciurus undulatus marwitzi* Müller, I can not believe that that name represents a form distinct from true *undulatus*. The type of *marwitzi* is virtually a topotype of *undulatus;* the characters presented to separate the form seem wholly unimportant and trifling; and furthermore the description of *marwitzi* agrees, even to its supposed distinguishing characters, very well indeed with the type-specimen of *undulatus*.

HELIOSCIURUS UNDULATUS SHINDI Heller.

Plate 9.

1914. *Heliosciurus rufobrachiatus shindi* Heller, Smithsonian Misc. Coll.. vol. 63, No. 7, p. 7. June. (Summit of Mount Umengo, Taita Hills, British East Africa, at 6,000 feet; type in U. S. Nat. Mus.)

Specimen.—One, the type, from—

British East Africa: Mount Umengo (Heller).

"This squirrel in confined to the remnant of forest covering the extreme summit of the Taita Hills, where it is very rare. The type was the only individual seen during a fortnight's stay on the summit of Umengo Mountain. Among the Wataita tribe this squirrel is known as *shindi*" (Heller, reference as above, p. 8).

HELIOSCIURUS UNDULATUS DAUCINUS Thomas.

1909. *Heliosciurus undulatus daucinus* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 101. August. (Mombasa, British East Africa; type in British Museum.)

Specimen.—One, from—

British East Africa: Mazeras (Heller).

Measurements of squirrels of the genus Heliosciurus.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Ear.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Breadth of brain-case.	Length of mandible.	Maxillary tooth row.	Mandibular tooth row.	Condition of teeth.
H. ruwenzorii.														
Uganda: Ruwenzori	172921	Male	208	228	50	19	47.1	28.5	14.3	22.5	28.5	8.8	9.0	Considerably worn.
H. rufo. nyansæ.														
B. E. A.:														
Kaimosi	182750	...do.	220	222	51	....	46.9	29.1	16.4	....	31.5	10.1	10.4	Moderately worn.
Do	182754	...do.	233	240	51	18	46.5	29.7	15.8	23.9	31.1	10.6	10.7	Do.
Do	182755	...do.	220	235	52	18	47.3	29.7	16.8	23.8	31.2	10.0	10.0	Do.
Do	182756	...do.	210	240	52	16	45.4	27.7	14.9	23.9	30.2	9.9	10.0	Unworn.
Do	182759	...do.	230	245	51	19	48.2	30.6	16.3	23.8	31.2	10.1	10.2	Considerably worn.
Do	182751	Female	230	240	53	....	48.1	30.7	17.0	24.2	31.5	10.2	....	Do.
Do	182753	...do.	232	252	52	17	48.8	31.4	16.2	24.8	32.9	10.3	10.2	Do.
Do	182758	...do.	220	248	55	....	47.6	30.7	16.7	24.2	32.5	10.0	10.3	Do.
Do	182762	...do.	205	192	48	15	47.4	28.5	16.2	23.3	30.5	10.1	10.1	Do.
Lukosa River	182765	Male	210	220	50	16	46.5	29.8	16.6	23.8	30.7	10.2	10.1	Do.
Do	182767	...do.	225	243	50	17	46.8	30.5	16.2	24.2	30.9	10.3	10.0	Little worn.
Do	182764	Female	215	218	49	18	47.7	31.6	16.6	23.9	31.7	10.0	10.3	Considerably worn.
Do	182766	...do.	220	230	51	15	....	29.0	16.9	....	31.6	9.9	9.8	Moderately worn.
H. keniæ.														
B. E. A.: Mount Kenia	164201	...do.	250	255	55	18	48.0	30.4	17.2	23.4	31.5	10.7	10.8	Much worn.
H. u. undulatus.														
B. E. A.: Kilimanjaro	[1] 19005	Male	....	....	....	....	48.0	30.6	16.8	24.3	30.8	10.7	10.5	Moderately worn.
G. E. A.: Kahe	19006	Female	....	....	....	....	....	30.8	17.7	22.8	33.2	10.5	10.6	Considerably worn.
H. u. shindi.														
B. E. A.: Mount Umengo	[1] 182768	Male	225	283	55	18	50.5	31.2	17.2	24.3	33.3	10.8	10.4	Much worn.
H. u. daucinus.														
B. E. A.: Mazeras	182769	Female	230	290	54	16	49.1	31.5	16.9	24.1	32.1	10.8	10.7	Moderately worn.
H. m. madogæ.														
Uganda: Uma	[1] 164828	Male	202	204	44	....	42.0	32.7	13.9	20.8	26.8	9.0	9.2	Considerably worn.

[1] Type.

HELIOSCIURUS MULTICOLOR MADOGÆ Heller.

Plate 10.

1911. *Heliosciurus multicolor madogæ* HELLER, Smithsonian Misc. Coll., vol. 56, No. 17, p. 1. February 28. (Uma, Uganda; type in U. S. Nat. Mus.)

Specimen.—One, the type:

UGANDA: Uma (K. Roosevelt).

This specimen was shot in a clump of bamboo.

HELIOSCIURUS MULTICOLOR LATERIS Thomas.

1909. *Heliosciurus multicolor lateris* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 102. August. (Lado; type in British Museum.)

Specimen.—One, from—

LADO: Rhino Camp (T. Roosevelt).

. This specimen is imperfect; the forward part, with skull, is missing, and it is impossible to make satisfactory comparison with the type of Heller's *madogæ*. The Lado specimen is, however, less buffy below than the specimen from the east side of the Nile.

Genus PARAXERUS Major.

1893. *Paraxerus* MAJOR, Proc. Zool. Soc. London, 1893, p. 189. June 1. (*P. cepapi.*)

1918. *Tamiscus* THOMAS, Ann. and Mag. Nat. Hist., ser. 9, vol. 1, p. 33. January. (*P. emini.*) [Valid as a subgenus.]

Three groups of squirrels in the East African collection are combined under the genus *Paraxerus*. The *boehmi* group includes small, sharply striped species represented only by a specimen from Uganda; the *palliatus* group, larger species superficially resembling certain forms of *Heliosciurus undulatus;* and the medium sized scrub-squirrels, *ochraceus* and its subspecies, are represented by several forms. These last are closely related to the type-species of the genus, *Paraxerus cepapi* of South Africa, but are uniformly smaller and usually show traces of the back-stripes so conspicuous in the *boehmi* group, but wanting in *cepapi* and *palliatus*. Thomas has proposed that the *boehmi* group be recognized as a distinct genus, *Tamiscus;* but the characters separating this group from typical *Paraxerus* are slight and the relationship is very close. I should not be willing to admit more than subgeneric rank for *Tamiscus*.

For measurements of specimens of *Paraxerus* see pages 17–19.

PARAXERUS EMINI EMINI (Stuhlmann).

1894. *Sciurus emini* STUHLMANN, Mit Emin Pascha ins Herz von Afrika, p. 320. (Atyangara, Semliki River, Uganda.)

1902. *Sciurus emini ugandae* NEUMANN, Sitz.-ber. Ges. nat. Freunde Berlin, 1902, p. 180. (Kampala and Entebbe, Unganda; specimens in Berlin Mus.)

1910. *Paraxerus bœhmi emini* ROOSEVELT, Afr. Game Trails, Amer. ed., p. 472; London ed., p. 484.

1918. *Tamiscus emini emini* THOMAS, Ann. and Mag. Nat. Hist., ser. 9, vol. 1, p. 34. January.

Specimen.—One, from—

UGANDA: 22 miles west of Kampala (Heller).

No specimen of *Paraxerus emini* from the type locality is available for comparison. Thomas[1] and Dollman[2] consider the two forms identical and Dollman has listed specimens of *emini* from Entebbe, Uganda, not far from where our specimen was collected, and at the type locality of *ugandæ*. In a review of the forms of the group published in 1918,[3] Thomas formally places *ugandæ* as a synonym of *emini*.

PARAXERUS PALLIATUS SUAHELICUS (Neumann).

1902. *Sciurus palliatus suahelicus* NEUMANN, Sitz.-ber. Ges. nat. Freunde Berlin, 1902, p. 178. (German East Africa opposite Zanzibar and southern part of British East Africa; no type designated.)

Specimens.—Twelve, including one in alcohol, as follows:

BRITISH EAST AFRICA: Mazeras (Heller).

Except for one specimen with a pale ochraceous tail, the skins in this series present a very uniform appearance.

Our collection contains no specimens of *Paraxerus palliatus palliatus*, but comparison of *suahelicus* with *Paraxerus palliatus ornatus* leaves me rather dubious as to the conspecific relationship of these two forms. Without material representing the intermediate type, however, it seems best to leave the form as usually placed by authors.

PARAXERUS OCHRACEUS ARUSCENSIS (Pagenstecher).

1885. *Sciurus cepapi* Smith var. *aruscensis* PAGENSTECHER, Jahrb. Hamb. Wiss. Anst., vol. 2, p. 42; Nat. Mus. Hamburg Ber. 1884, p. 42. (Pangani River near coast, and Great Aruscha, Meru Mts., German East Africa.)

1892. *Sciurus poensis* TRUE, Proc. U. S. Nat. Mus., vol. 15, p. 467. (Not of Smith.)

Specimens.—Thirty-one, as follows:

BRITISH EAST AFRICA: Changamwe, 18, including 4 in alcohol (Mearns); Maji-ya-chumvi, 3 (Heller); Mount Kilimanjaro, 1 (Abbott); Mount Sagalla, summit, 1 (Heller); Mtoto Andei, 1 (Heller); Ndi, 1 (Heller); Taveta, 5 (Abbott); Voi, 1 (Heller).

Only one race is represented in the series listed above. At first sight the Taita Hills lot appears somewhat lighter colored, grayer above and less ochraceous below, but a careful study of the specimens convinces me that they can not be separated from the Taveta or the coast series, which are surely identical. The extreme gray example in the Maji-ya-chumvi series is an aged female, lately nursing, and the only grayish specimen in the Taveta series proves to be the next oldest specimen of the entire thirty-one examples, and also a nursing female. The grayish "phase" of coloration in *aruscensis* may be a condition of pelage of old age, or of nursing females. Certainly the youngish specimens from all localities are the extreme of the ochraceous phase; the older specimens with well-worn teeth are grayer with lighter underparts; and the only two aged specimens, with the teeth excessively worn, are distinctly grayish rather than ochraceous in color, with gray tails and very pale buffy ochraceous bellies. These last two specimens are the only nursing females in the entire series. The Taita Hills specimens are all considerably older, with more worn molars, than the specimens from Taveta or Changamwe, and the very slightly lighter coloration may be explained in this way or even by a slight difference in pelage. At any rate, the difference is so little that it is hardly worth considering.

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[1] Trans. Zool. Soc. London, vol. 19, p. 498. March, 1910.

[2] Revue Zool. Afric., vol. 4, p. 79. 1914.

[3] Ann. and Mag. Nat. Hist., ser. 9, vol. 1, pp. 34–38. January, 1918.

Doctor Abbott collected this squirrel up to 5,000 feet on Kilimanjaro. A female collected by Heller at Ndi, November 3, contained two embryos and one collected at Maji-ya-chumvi, December 13, the same number. Mearns records the color of the iris as dark brown.

Through the kindness of Dr. Witmer Stone I have been able to examine during work on this group the type of *Sciurus ganana* Rhoads,[1] from the Ganana River, between British East Africa and Italian Somaliland. The type differs from all specimens of the *Paraxerus ochraceus* group in the collection by its much yellower coloration, but is obviously closest to *aruscensis*, of which general style it is the extreme. The specimen is an adult nursing female. The upper parts and sides are much more yellowish than in any specimen of *aruscensis*, the limbs being almost clear yellowish buff. It is slightly smaller than *aruscensis*, with a more slender skull. The two forms almost certainly intergrade in eastern British East Africa. Measurements of the type of *Paraxerus ochraceus ganana* are given for comparison with other forms in the table on page 19.

PARAXERUS OCHRACEUS JACKSONI (de Winton).

1897. *Sciurus jacksoni* DE WINTON, Ann. and Mag. Nat. Hist., ser. 6, vol. 19, p. 574. May. (Kikuyu, British East Africa; type in British Museum.)

1909. *Paraxerus jacksoni capitis* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 105. August. (Nairobi Forest, British East Africa; type in British Museum.)

1910. *Paraxerus jacksoni* and *Paraxerus jacksoni capitis* ROOSEVELT, African Game Trails, Amer. ed., pp. 472 and 476; London 3d., pp. 484 and 488.

1914. *Paraxerus jacksoni* COCKERELL, MILLER, and PRINTZ, Zool. Anz., vol. 44, p. 435. June 23.

Specimens.—Fourteen, from localities as follows:

BRITISH EAST AFRICA: Nairobi, 10 (Mearns, Loring); Nyeri, 3 (Heller, Mearns); Wambugu, 1 (Loring).

Mearns notes the mammæ, on females from Nairobi and Nyeri, as three pairs. The Nyeri specimens are approaching somewhat the Guaso Nyiro form, *Paraxerus ochraceus kahari*, which is slightly darker in color.

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[1] Proc. Acad. Nat. Sci., Phila., 1896, p. 522.

Measurements of squirrels of the genus Paraxerus.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Breadth of braincase.	Breadth of rostrum.	Length of mandible.	Maxillary tooth row.	Mandibular tooth row.	Condition of teeth.
P. emini.														
Uganda: Kampala	164974	Male				32.0	19.4	9.9	17.1	5.3	20.9	6.3	6.2	Moderately worn.
P. p. suahelicus.														
B. E. A.:														
Mazeras	182797	...do	225	220	50	46.0	30.0	16.0	22.2	8.9	31.0	9.5	9.3	Do.
Do	182801	...do	230	226	50	46.9	30.5	16.5	22.8	8.9	31.9	9.2	9.6	Considerably worn.
Do	182805	...do	220	228	50	46.0	30.0	16.2	22.2	8.5	31.2	9.5	9.3	Moderately worn.
Do	182794	Female	210	215	50	46.0	28.7	14.9	22.8	8.6	31.0	9.7	9.5	Do.
Do	182795	...do	210		48	45.9	30.1	15.6	22.8	8.4	30.3	9.4	9.4	Considerably worn.
Do	182796	...do	230	218	49					8.0	31.1	9.6	9.3	Do.
Do	182798	...do	220		51	46.7	29.9	14.8	22.4	8.8	31.5	9.6	9.7	Moderately worn.
Do	182800	...do	220		50	48.0		15.3	22.7	9.0	31.8	9.6	9.4	Much worn.
Do	182802	...do	210	230	52	47.3	30.3	15.0	23.0	8.6	31.1	9.5	9.8	Considerably worn.
Do	182803	...do	210	220	48	45.7	29.9	14.9	22.3	8.5	30.4	9.3	9.4	Do.
P. o. aruscensis.														
B. E. A.:														
Mount Kilimanjaro	35244	...do				36.0	21.9	10.5	17.8	6.0	24.0	7.1	7.0	Moderately worn.
Taveta	34733	...do				35.7		10.6	18.2	5.9	22.7	7.3	7.1	Much worn.
Do	37376	...do						10.4		5.9	21.3	6.9	6.8	Moderately worn.
Do	34732					34.7	22.5	10.4	18.0	6.0	22.7	7.2	7.2	Do.
Mtoto Andei	181767	Male	165	170	36	34.2	21.4	10.6	17.9	5.8	21.8	6.8	6.7	Do.
Mount Sagalla	182787	...do	165	162	38	35.7	22.9	10.9	18.7	6.3	23.1	7.3	7.1	Considerably worn.
Voi	182785	...do	160	180	40	35.6	22.2	10.9	18.1	6.2	23.6	7.1	7.3	Do.
Ndi	182786	Female	170	160	37	36.3	22.8	10.5	17.9	6.3	23.1	7.1	7.0	Moderately worn.

Measurements of squirrels of the genus Paraxerus—Continued.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Breadth of braincase.	Breadth of rostrum.	Length of mandible.	Maxillary tooth row.	Mandibular tooth row.	Condition of teeth.
P. o. aruscensis—Continued.														
B. E. A.—Continued.														
Maji-ya-chumvi	182788	Male	158	155	37	....	....	10.6	....	5.9	22.5	7.4	6.8	Little worn.
Do.	182789	...do.	165	165	37	36.4	22.2	11.0	17.5	6.3	23.5	7.2	7.1	Considerably worn.
Do.	182790	Female.	165	....	39	37.7	23.5	11.2	17.9	6.6	24.4	7.2	7.3	Much worn.
Changamwe	164214	Male	160	150	37	....	....	....	....	....	....	....	....	
Do.	164216	...do.	168	162	37	....	....	....	....	....	....	....	....	
Do.	164218	...do.	164	170	38	....	....	....	....	....	....	....	....	
Do.	165392	....	....	....	....	35.5	22.1	11.0	18.2	5.9	22.3	6.8	6.7	Moderately worn.
Do.	165397	....	....	....	....	36.7	22.7	11.6	18.2	6.3	23.6	7.0	7.1	Do.
P. o. jacksoni.														
B. E. A.:														
Nairobi	162214	Male	180	175	43	36.0	22.8	10.7	19.0	6.3	23.6	7.3	7.3	Little worn.
Do.	162217	...do.	170	183	43	36.4	22.1	10.7	18.7	6.2	23.5	7.7	7.4	Moderately worn.
Do.	162218	...do.	175	180	43	37.0	23.6	10.9	19.9	6.5	24.9	7.7	7.5	Do
Do.	162220	...do.	160	167	43	....	23.5	10.9	18.8	6.4	24.3	7.5	7.7	Do.
Do.	162215	Female	172	182	43	36.5	23.1	10.6	18.3	6.3	23.9	7.8	7.8	Little worn.
Do.	162219	...do.	173	183	43	36.9	24.1	11.8	19.9	6.6	25.4	7.5	7.6	Moderately worn.
Do.	162222	...do.	170	180	45	37.3	23.6	10.7	20.0	5.9	24.9	7.7	7.8	Do.
Do.	162223	...do.	175	....	44	38.9	24.1	10.9	20.0	6.6	25.9	7.8	7.5	Do.
Do.	164206	...do.	173	183	43	37.4	23.6	11.2	19.7	6.7	24.5	7.1	6.8	Considerably worn.
Wambugu	164222	...do.	171	160	43	38.1	23.3	11.3	18.7	6.3	24.5	7.7	7.8	Moderately worn.
Nyeri	182792	Male	170	176	41	38.9	23.9	11.6	19.7	6.4	25.4	7.6	7.7	Do.
Do.	164205	Female.	175	175	40	38.3	23.7	12.1	19.2	6.7	25.4	7.5	7.3	Considerably worn.
Do.	182793	...do.	170	174	40	39.3	24.7	11.5	19.2	6.9	26.2	7.8	7.7	Moderately worn.

P. o. kakari.														
B. E. A.:														
Jambeni Mountains	182791	Male	165	161	41	37.3	23.8	11.3	18.8	6.5	24.1	7.5	7.5	Do.
Meru	[1] 164203	Female	175	172	42	37.0	24.0	11.3	19.0	6.3	24.3	7.2	7.3	Do.
Mount Kenia	164200	...do	165	170	43	37.5	24.3	11.3	19.0	6.3	25.5	7.9	7.8	Slightly worn.
Do	164202	Male	190	165	42	38.6	24.3	11.7	19.4	6.5	24.9	7.8	8.1	Moderately worn.
P. o. animosus.														
B. E. A.:														
Mount Nyiro	182783	...do	143	....	38	....	....	....	....	....	....	....	....	
Mount Lololokwi	182770	...do	150	....	36	34.1	21.6	10.3	17.5	6.2	22.0	7.0	7.0	Moderately worn.
Do	182772	...do	160	164	37	35.3	22.7	9.9	17.7	6.2	22.4	7.1	7.1	Do.
Do	182775	...do	150	170	37	34.0	21.3	9.3	17.4	5.9	22.2	7.1	6.8	Little worn.
Do	182776	...do	....	....	....	34.2	22.1	10.0	17.6	6.0	21.7	7.2	7.1	Moderately worn.
Do	182780	...do	155	162	38	34.8	22.3	10.7	18.2	6.0	23.2	6.9	7.1	Do.
Do	182781	...do	150	153	36	35.2	20.8	10.3	17.8	6.1	22.8	7.3	7.1	Do.
Do	182773	Female	155	160	38	34.8	22.3	10.2	17.6	5.8	22.7	7.4	7.1	Do.
Do	182774	...do	150	158	37	35.2	22.5	10.6	17.8	6.3	22.2	7.0	6.8	Considerably worn.
Do	182777	...do	143	167	37	33.2	21.2	9.6	18.0	5.8	22.1	7.1	7.1	Unworn.
Do	182779	...do	150	152	36	33.5	22.3	10.2	18.2	6.0	....	7.3	7.0	Moderately worn.
P. o. percivali.														
B. E. A.:														
Marsabit Lake	182808	Male	155	155	37	35.0	22.3	11.6	17.7	6.4	23.3	6.7	6.7	Considerably worn.
Do	182809	...do	160	165	39	....	....	....	....	....	....	....	....	
Do	182806	Female	145	160	34	....	....	....	....	6.1	21.8	7.7	7.1	Unworn.
Do	182807	...do	151	160	38	34.9	22.3	10.6	18.1	6.5	23.0	7.4	7.0	Little worn.
P. o. ganana.														
Ganana River	[2] 3809	...do	150	170	38	35.2	21.1	10.8	16.8	5.6	22.1	7.4	6.8	Moderately worn.

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[1] Type.

[2] Type, in Acad. Nat. Sci., Philadelphia.

PARAXERUS OCHRACEUS KAHARI Heller.

Plate 10.

1911. *Paraxerus kahari* HELLER, Smithsonian Misc. Coll., vol 56, No. 17, p. 2. February 28.. (Meru Boma, northeast of Mount Kenia, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Four, from the following localities:

BRITISH EAST AFRICA: Jambeni Mountains, S. W., 1 (Percival); Meru, 1 (Heller); Mount Kenia, west slope at 7, 000 feet, 2 (Heller).

This is a slightly darker subspecies very close to *jacksoni*, but tending somewhat toward *percivali*. The type-specimen is a young nursing female, very thinly haired on the underparts, and slightly lighter and more olivaceous above than the other specimens, all of which have much darker underparts. The back-stripes are more distinct in this subspecies than in any of the other forms found in British East Africa, and are quite plainly seen on all four of the specimens. "Among the Wameru tribe this squirrel is known as *kahari*" (Heller).

PARAXERUS OCHRACEUS ANIMOSUS Dollman.

1911. *Paraxerus ochraceus animosus* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 8, p. 655. November. (Mount Nyiro, British East Africa; type in British Museum.)

Specimens.—Sixteen, from localities as follows:

BRITISH EAST AFRICA: Lorghi Mountains, North, 1 (Percival); Mount Lololokwi, 13 (Heller); Mount Nyiro, 6,000 feet, 1 (Percival); Orr Valley, Mount Nyiro, 1 (Percival).

The specimens collected on Mount Lololokwi are indistinguishable in color from the topotypes from Mount Nyiro.

PARAXERUS OCHRACEUS PERCIVALI Dollman.

1911. *Paraxerus percivali* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 8, p. 653. November. (Marsabit, British East Africa; type in British Museum.)

1911. *Paraxerus ochraceus augustus* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 8, p. 654. November. (Marsabit, British East Africa; type in British Museum.)

Specimens.—Four, as follows:

BRITISH EAST AFRICA: Marsabit Lake (Percival).

Three skins in this small series are of the dark type of coloration while the fourth is much lighter, more yellowish-ochraceous, apparently as in the type of "*augustus*." There can scarcely be any doubt as to the propriety of uniting these two named forms, which are evidently the extreme types of coloration in an exceedingly variable subspecies. Mr. Heller, who examined the specimens in London, made the following manuscript note on these squirrels: "Types and large series examined. The type of *augustus* is the extreme light specimen and very different from the blackish-backed type of *percivali*, but both extremes shade into one another and both inhabit the same altitudes on the mountain."

Genus PROTOXERUS Major.

1893. *Protoxerus* Major, Proc. Zool. Soc. London, p. 189. (*P. stangeri.*)

The discovery of the giant forest squirrel by the Rainey Expedition in the Kakumega Forest extended the known range of this West African genus into British East Africa. A race had previously been described by Thomas from Entebbe, Uganda, as *Protoxerus stangeri centricola.*[1] No specimens of giant squirrels were obtained by the Smithsonian African Expedition in Uganda and the Entebbe form is unrepresented in our collections.

PROTOXERUS STANGERI BEA Heller.

Plate 11.

1912. *Protoxerus stangeri bea* Heller, Smithsonian Misc. Coll., vol. 59, No. 16, p. 2. July 5. (Lukosa River, Kakumega Forest, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Twelve, from the following localities:

British East Africa: Kaimosi, 7 (Heller); Lukosa River, 5 (Heller).

The skins in this series show considerable variation in color, and it is

Measurements of specimens of Protoxerus stangeri bea from British East Africa.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Ear	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth	Breadth of brain-case.	Length of mandible.	Maxillary tooth row.	Mandibular tooth row.	Condition of teeth.
Lukosa River	[1] 181786	Male	270	290	66	20	60.9	38.8	20.3	29.3	42.5	11.8	12.2	Moderately worn.
Do.	182818	do.	270	290	63	20	59.4	37.8	19.8	28.6	42.2	11.3	11.9	Do.
Do.	182819	do.	270	300	62	22	60.1	37.5	20.3	28.6	42.4	11.8	11.7	Do.
Do.	182817	Female	260		60	20		37.7	20.1	28.8	41.9	11.5	12.0	Do.
Do.	182820	do.	280	300	66	20	62.4	37.9	19.9	28.7	44.4	11.6	12.2	Considerably worn.
Kaimosa	182810	Male	260	305	66	21								
Do.	182811	do.	260	305	61	22	59.3	36.5	18.1	28.3	41.1	11.4	12.2	Unworn.
Do.	182812	do.	240	305	62	22			17.5		38.6	10.9	11.4	Do.
Do.	182813	Female					61.5	38.4	19.3	28.6	43.1	11.9	11.7	Moderately worn.
Do.	182814	do.	290	310	64	21	61.6	37.1	20.9	28.4	43.4	11.5	12.2	Considerably worn.
Do.	182815	do.	270	300	64	20	60.7	38.5	21.2	28.8	45.0	11.2	12.2	Much worn.
Do.	182816	do.	270	285	63	22	60.3	37.1	20.3	28.3	43.0	11.5	11.9	Do.

[1] Type.

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[1] *Sciurus stangeri centricola* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 18, p. 297, October, 1906.

evident that new subspecies of *Protoxerus* should not be named unless based on good series of specimens. The most common variation is in the intensity of the "reddish" color on the back and especially on the rump and hind limbs. In our series this varies from Sudan brown to chestnut, or even, in one specimen, blackish. The single blackish specimen has the upper sides of the hands and feet largely pure glossy black.

Genus XERUS Hemprich and Ehrenberg.

1832. *Xerus* Hemprich and Ehrenberg, Symb. Phys., vol. 1, sig. e e (text to pl. 9). (*X. brachyotus.*)

1842. *Spermosciurus* Lesson, Nouv. Tabl. Anim., p. 110. (*X. rutilus.*)

1850. *Xeros* Burmeister, Verz. Mus. Halle-Wittemb., p. 15. (pro *Xerus.*)

In addition to the two well-marked forms of this ground-squirrel which are represented in our collection, several subspecies have been named from northern British East Africa, Abyssinia, and Somaliland.

For measurements of the specimens of this genus see page 23.

XERUS RUTILUS RUFIFRONS Dollman.

1911. *Xerus dabagala rufifrons* Dollman, Ann. and Mag. Nat. Hist., ser. 8, vol. 7, p. 518. May. (Northern Guaso Nyiro, British East Africa; type in British Museum.)

Specimens.—Thirteen, from the following localities:

British East Africa: Archer's Post, Northern Guaso Nyiro, 1 (Heller); Isiola River, 1 (Heller): Kara Water, Marsabit Road, 3 (Heller); Kenya Water, Marsabit Road, 1 (Heller); Merelle Water, Marsabit Road, 4 (Heller); Mount Nyiro, south of, 1 (Percival); Northern Guaso Nyiro River, 1 skull (K. Roosevelt); Quoy Water, Marsabit Road, 1 (Heller).

There is considerable variation among the skins of this series in the extent of the red on the crown and also in the amount of black on the head and nape. The general color of the back varies greatly in the amount of blackish speckling, extent of the yellowish-buff dorsal area, and in the intensity of the vinaceous ground color. The skins from more northern localities are paler than those from Archer's Post and Isiola River and are doubtless approaching some one of the Abyssinian forms in color.

A female collected at Archer's Post, September 23, contained two large embryos.

XERUS RUTILUS SATURATUS Neumann.

1892. *Xerus rutilus* True, Proc. U. S. Nat. Mus., vol. 15, p. 467. (Specimen from Taveta; not of Cretzschmar.)

1900. *Xerus saturatus* Neumann, Zool. Jahrb., Syst., vol. 13, p. 546. (Kibwezi, British East Africa.)

Specimens.—Two, as follows:

British East Africa: Taveta, 1 (Abbott); Voi River, Taita Hills, 1 (Heller).

Measurements of squirrels of the genera Xerus and Euxerus.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Breadth of braincase.	Breadth of center of rostrum.	Length of mandible.	Maxillary tooth row.	Mandibular tooth row.	Condition of teeth.
X. r. rufifrons.														
B. E. A.:														
Marsabit Road	182823	Male	230	185	50	49.7	29.4	15.4	24.5	9.6	31.7	10.1	10.8	Much worn.
Do	182826	...do	230	195	50	....	....	16.0	....	9.5	31.0	9.9	10.3	Do.
Do	182827	Female	220	187	51	48.7	29.7	15.4	24.1	9.6	31.4	9.8	10.3	Do.
Do	182829	...do	230	193	56	50.6	30.1	15.1	24.2	10.0	32.0	10.4	10.3	Do.
Archer's Post	182831	...do	220	....	51	49.4	30.5	15.4	24.9	10.3	31.6	9.9	10.4	Moderately worn.
Isiola River	182822	...do	230	203	56	48.0	30.0	13.4	24.7	9.4	32.0	10.8	11.4	Unworn.
X. r. saturatus.														
B. E. A.:														
Voi River	182832	...do	235	185	52	53.4	33.3	17.9	25.7	11.3	....	10.8	....	Moderately worn.
Taveta	35110	...do	....	....	....	....	....	15.9	....	10.5	33.9	11.0	11.4	Do.
E. e. leucoumbrinus.														
Eritrea:														
Agordat	122540	...do	....	....	....	....	31.1	15.5	25.8	11.0	36.6	13.2	13.1	Do.
Do	122541	...do	....	....	....	....	32.9	14.7	25.1	10.8	37.0	12.6	12.7	Much worn.
E. lacustris.														
B. E. A.: Kaimosi	197964	Male	298	269	62	57.8	33.8	15.7	26.5	11.2	38.6	13.2	13.5	Moderately worn.
E. microdon.														
B. E. A.:														
Fort Hall	164238	...do	290	200	63	59.2	32.5	17.4	25.6	9.8	39.0	12.3	12.7	Do.
Do	164240	...do	313	215	62	60.4	34.8	17.4	26.1	11.2	39.8	13.2	12.9	Do.
Oni	164244	...do	285	220	63	57.9	32.4	16.4	25.4	9.6	37.5	13.1	12.9	Little worn.
Wambugu	164239	Female	265	205	61	56.8	30.0	16.2	24.7	9.0	....	13.4	13.3	Unworn.
Mtoto Andei	181768	Male	285	125	61	58.0	32.2	15.8	25.9	9.7	36.7	12.9	12.3	Moderately worn.
Do	181771	...do	290	208	61	....	....	16.5	....	10.7	37.9	....	12.2	Do.
Do	181770	Female	275	220	63	57.5	31.8	16.0	25.6	10.2	37.3	13.3	12.7	Do.
Do	181772	...do	280	205	61	....	....	....	....	10.4	36.7	12.7	12.8	Do.

This darker race of *Xerus rutilus* must be very much like the later described *Xerus dabagala dorsalis* Dollman[1] from Baringo. Mr. Dollman has in fact referred specimens from the Tsavo River, virtually topotypes, to his form.[2] Neumann's specimens were young, which perhaps accounts for his description of the hands and feet as "deep rust-red;" the feet of younger specimens of ground squirrels seem to be darker than those of adults. The color is still more likely to have been due to soil stain, as the Taveta specimen collected by Doctor Abbott has the feet deeply stained by red soil, the pigment being plainly visible with the aid of a lens.

Genus EUXERUS Thomas.

1909. *Euxerus* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 3, p. 473. June. (*E. erythopus.*)

No East African forms have been named in this genus since Mr. Thomas published his key and synopsis of the group (as a subdivision of *Xerus*) in 1905.[3]

For measurements of specimens of squirrels of this genus see page 23.

EUXERUS ERYTHOPUS LEUCOUMBRINUS (Rüppell).

[1835]. *Sciurus leucoumbrinus* Rüppell, Neue Wirbelth. Fauna Abyssinien gehörig, Säug., p. 38. 1835–1840. (Abyssinia, Sennaar, and Kordofan.)

Specimens.—Two, as follows:

Eritrea: Agordat (from W. F. H. Rosenberg).

EUXERUS LACUSTRIS (Thomas).

1905. *Xerus erythropus lacustris* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 15, p. 388. April. (Masindi, Unyoro, Uganda; type in British Museum.)

Specimen.—One, from—

British East Africa: Kaimosi (Turner).

No specimens of typical *Euxerus lacustris* are available for a direct comparison, but the Kavirondo specimen agrees so well with Mr. Thomas's description that I have no hesitation in labeling it *lacustris*. I believe the form to go rather with *microdon* than with *erythopus*, as the teeth most resemble the East African form. All the races will probably prove to be subspecies of *erythopus*.

EUXERUS MICRODON (Thomas).

1905. *Xerus microdon* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 15, p. 389. April. (Kitui, British East Africa; type in British Museum.)

1905. *Xerus microdon fulvior* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 15, p. 389. April. (Fort Hall, British East Africa; type in British Museum.)

1910. *Euxerus microdon fulvior* Roosevelt, African Game Trails, Amer. ed., p. 472; London ed., p. 484.

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 7, p. 519. May, 1911.

[2] Revue Zool. Africaine, vol. 4, p. 89. July, 1914.

[3] Ann. and Mag. Nat. Hist., ser. 7, vol. 15, pp. 387–390. April, 1905.

Specimens.—Thirteen, from localities as follows:

British East Africa: Fort Hall, 2 (Mearns); Mtoto Andei, 6 (Heller); Oni, 1 (Loring); Wambugu, 4 (Loring, Mearns).

The specimens from Mtoto Andei are apparently inseparable from those from the vicinity of Fort Hall. As with all ground squirrels, skins of this species are frequently stained from the soil and the color of the feet, tail, and even the entire body is sometimes greatly changed. This is especially so with animals living in red soil and the pigment can sometimes be seen with a strong glass.

Mearns records the mammæ as $\frac{0}{0}-\frac{2}{2}-\frac{1}{1}=3$ pairs, on a specimen from Wambugu.

Family CRICETIDÆ.

Genus DIPODILLUS Lataste.

1881. *Dipodillus* Lataste, Le Naturaliste, vol. 1, p. 506. (*D. simoni.*)

Four forms of these pigmy gerbils are recognized in British East Africa; three of them are included in the National Museum collection. The fourth, described by Dollman from Voi as *Dipodillus percivali*,[1] is probably the *Gerbillus pusillus* of Peters,[2] the type of which came from Taita and is preserved in the Berlin Museum. Numerous species are known from northern Africa.

For measurements of specimens of *Dipodillus* see table, page 26.

DIPODILLUS WATERSI (de Winton).

1901. *Gerbillus* (*Dipodillus*) *watersi* de Winton, Nov. Zool., vol. 8, p. 399. December 31. (Shendi, Sudan; type in British Museum.)

1905. *Dipodillus watersi* Schwann, Nov. Zool., vol. 12, p. 3. January.

Specimens.—Three, as follows:

Sudan: Kerma, 1 (Rothschild); Merowe, 2 (Rothschild).

This species is superficially very much like *Dipodillus stigmonyx* from Khartoum, but is slightly paler in color and has a smaller hind foot.

DIPODILLUS STIGMONYX (Heuglin).

1877. *Meriones stigmonyx* Heuglin, Reise Nordost-Afrika, vol. 2, p. 78. (Khartoum, Sudan.)

Specimens.—Six, including two in alcohol, as follows:

Sudan: Khartoum (Heller, Loring).

DIPODILLUS DIMINUTUS Dollman.

1911. *Dipodillus diminutus* Dollman, Ann. and Mag. Nat. Hist., ser. 8, vol. 7, p. 520. May. (Nyama Nyango, Northern Guaso Nyiro, British East Africa; type in British Museum.)

Specimen.—One, from—

British East Africa: Kurseine, Northern Guaso Nyiro (Heller).

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 14, p. 488. December, 1914.

[2] Mon.-ber. Akad. Berlin, 1878, p. 201.

Measurements of the pygmy gerbils of the genus Dipodillus.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot	Skull: Condylobasal length.	Greatest breadth.	Length of nasals.	Breadth of braincase.	Length of auditory bulla.	Mandible.	Maxillary tooth row.	Mandibular tooth row.	Observations.
D. watersi.														
Sudan:														
Kerma	141502	Female	69	90	21	....	....	7.8	....	7.6	12.3	3.5	3.4	Teeth moderately worn.
Merowe	141503	Male	69	85	20	....	11.8	7.0	11.2	7.1	11.2	3.3	3.4	Do.
Do	141504	...do	74	87	20	19.8	12.2	7.4	11.3	7.4	11.4	3.3	3.4	Do.
D. stigmonyx.														
Sudan:														
Khartoum	165283	...do	68	93	21	20.3	12.0	7.8	11.5	7.4	11.7	3.3	3.1	Do.
Do	165284	...do	80	108	24	21.3	12.8	8.7	11.8	7.6	12.3	3.3	3.3	Do.
Do	165285	...do	80	120	24	22.2	13.2	8.8	12.0	7.8	12.7	3.3	3.3	Do.
Do	165286	...do	70	111	22	21.3	12.6	8.3	11.8	7.8	12.2	3.3	3.3	Do.
D. diminutus.														
B. E. A.: N. Guaso Nyiro	183924	Female	72	100	19	21.7	12.7	9.0	11.7	7.3	12.5	3.3	3.4	Teeth much worn.
D. h. harwoodi.														
B. E. A.:														
Lake Naivasha	162326	Male	78	107	22	21.8	12.8	9.4	12.1	7.7	12.7	3.8	3.9	Teeth moderately worn.
Do	162293	...do	80	96	22	21.9	13.4	9.4	12.6	7.7	13.3	3.9	3.9	Do.
Do	162295	...do	86	112	22	22.9	13.5	10.1	12.5	7.8	13.5	4.0	3.8	Do.
Do	162297	...do	80	100	22	22.9	13.3	10.2	12.6	7.8	13.3	3.8	3.8	Do.
Do	162298	...do	82	101	22	22.6	13.5	9.4	12.7	7.6	13.2	4.0	3.8	Do.
Do	162300	...do	77	107	22	21.9	13.2	9.4	12.2	7.8	12.8	3.8	3.7	Do.
Do	162303	...do	81	102	22	22.2	12.6	9.8	11.4	7.4	13.2	4.0	3.8	Do.
Do	162287	Female	78	102	22	21.8	13.3	9.5	12.3	7.7	13.0	3.8	3.7	Do.
Do	162288	...do	83	109	22	22.8	13.5	9.8	12.1	7.9	13.3	4.0	3.8	Do.
Do	162291	...do	78	106	22	22.1	13.2	9.8	12.0	7.5	13.3	3.8	3.6	Do.

Do.	162302	...do....	75	105	22	21.8	12.8	9.5	12.1	7.8	12.6	3.9	3.7	Do.
Do.	162305	...do....	80	107	22	22.0	13.2	9.8	11.9	7.7	13.0	3.9	3.8	Do.
Do.	162306	...do....	75	101	22	21.7	12.9	9.4	12.1	7.3	12.7	3.0	3.7	Do.
Do.	162307	...do....	80	99	22	21.3	13.1	9.7	12.3	7.8	12.6	3.8	3.8	Teeth much worn.
Do.	162308	...do....	78	98	21	22.8	13.1	9.8	12.4	7.3	12.9	3.9	3.8	Teeth moderately worn.
Do.	162310	...do....	77	101	22	22.5	13.3	9.8	12.2	7.5	13.3	3.7	3.6	Do.
Do.	162311	...do....	83	99	22	22.7	13.8	10.2	12.4	7.6	14.0	3.8	3.3	Teeth much worn.
Do.	162312	...do....	80	101	22	22.2	13.3	9.5	12.6	7.8	13.8	4.1	3.9	Teeth moderately worn.
Do.	162314	...do....	80	104	22	22.8	13.3	9.8	12.2	7.7	13.5	3.9	3.8	Do.
Naivasha Station	162319	Male....	77	102	22	23.1	13.8	10.0	12.5	7.4	13.6	3.7	3.5	Do.
D. h. luteus.														
B. E. A.:														
So. Guaso Nyiro River	162274	...do....	81	98	21	22.6	13.0	9.9	12.1	7.6	12.8	3.7	3.5	Do.
Do.	162275	...do....	80	99	22	22.6	13.4	9.5	12.5	7.7	13.5	4.0	3.4	Do.
Do.	162276	...do....	84	97	21	23.0	13.4	10.2	12.5	7.5	13.8	3.8	3.6	Do.
Do.	162282	...do....	77	103	21	22.2	13.4	8.9	12.6	7.6	13.0	3.7	3.5	Do.
Do.	162273	Female.	80	95	23	22.6	13.3	....	12.2	7.6	13.3	4.0	3.6	Do.

The soles of the feet in this specimen are more hairy than in any specimen of *Dipodillus harwoodi*, but do not approach in this respect the conditions usual in *Gerbillus* or in *Taterillus*.

DIPODILLUS HARWOODI HARWOODI (Thomas).

1901. *Gerbillus* (*Dipodillus*) *harwoodi* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 8, p. 275. October. (Lake Naivasha, British East Africa; type in British Museum.)

1910. *Dipodillus harwoodi* ROOSEVELT, African Game Trails, Amer. ed., pp. 472, 477, 484: London ed., pp. 484, 488, 495. (Part; specimens from Naivasha.)

Specimens.—Forty-nine, from localities as follows:

BRITISH EAST AFRICA: Lake Naivasha, 43, including 10 in alcohol (Loring, Mearns); Naivasha Station, 6 (Loring).

On the sandy desert flats on the southwest side of Lake Naivasha they [*D. harwoodi*] were abundant. The holes running obliquely into the ground were sometimes blocked with sand from the inside. On the opposite side of the lake there was less sand, and here the gerbilles were found only in spots. In sand alone the burrows resembled those described, but where the ground was hard they entered almost perpendicular and were never blocked. Often seed pods and tiny cockle burrs were strewn about the entrances.[1]

DIPODILLUS HARWOODI LUTEUS Dollman.

1910. *Dipodillus harwoodi* ROOSEVELT, African Game Trails, Amer. ed., pp. 477, 484; London ed., pp. 488, 495. (Part; specimens from Southern Guaso Nyiro region.)

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[1] Loring, in Roosevelt's African Game Trails, Appendix C, p. 484. 1910.

1914. *Dipodillus luteus* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 14, p. 489. December. (Southern Guaso Nyiro, Nyanza Province, British East Africa; type in British Museum.)

Specimens.—Nine, including three in alcohol, as follows:

BRITISH EAST AFRICA: Southern Guaso Nyiro River (Loring, Heller, Mearns).

The Southern Guaso Nyiro form of the pygmy gerbil is closely related to true *harwoodi* of Naivasha. It is distinguished only by its paler and brighter color.[1]

Mearns records the color of the iris in this animal as dark brown.

Genus TATERILLUS Thomas.

1910. *Taterillus* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 6, p. 222. August. (*T. emini.*)

Although several forms of gerbils of the genus *Taterillus* have been recorded from British East Africa northward into Sudan, only one species was obtained by the Smithsonian African Expedition and no other specimens have ever reached the museum from any source.

TATERILLUS EMINI (Thomas).

1892. *Gerbillus emini* THOMAS, Ann. and Mag. Nat. Hist., ser. 6, vol. 9, p. 78. January. (Wadelai, Uganda; type in British Museum.)

1910. *Tatera emini* ROOSEVELT, African Game Trails, Amer. ed., p. 472; London ed., p. 484.

Specimens.—Five, from localities as follows:

LADO: Rhino Camp, 1 (Loring).

UGANDA: Gondokoro, 4, including 1 in alcohol (Loring).

Genus TATERA Lataste.

1882. *Tatera* LATASTE, Le Naturaliste, vol. 4, p. 126. (*T. indicus.*)

1897. *Gerbilliscus* THOMAS, Proc. Zool. Soc. London, p. 433. (*T. böhmi.*) [Valid as a subgenus.]

1917. *Taterona* WROUGHTON, Journ. Bombay Nat. Hist. Soc., vol. 25, No. 1, p. 40. (*T. afra.*)

Two well marked subgenera of gerbils referable to *Tatera* are found in East Africa. Typical *Tatera* is widely distributed and is abundantly represented in the museum collection. The second subgenus *Gerbilliscus*, is represented in the collection by only a single form. This is the large white-tailed gerbil of the *böhmi* group which is abundant in the Southern Guaso Nyiro region of British East Africa, and which was described by Heller as *Tatera varia*.

In describing the genus *Taterona*, Wroughton has separated the species usually referred to *Tatera* Lataste into two groups, the African forms all going into his new genus while *Tatera* is restricted to Asia. The characters used seem to be of too little value to justify such a proceeding; of those mentioned, the shape of the lateral parietal sutures alone appears to be fairly constant, and it seems of trifling importance. Some specimens of African species have a dark stripe along the under side of the tail, one of the chief characters used by Wroughton to distinguish the Asiatic species (see below, under *Tatera vicina vicina*).

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[1] Not "duller," as stated by Dollman in the original description.

For measurements of specimens of *Tatera* see table, pages 33–35.

TATERA VICINA VICINA (Peters).

1878. *Gerbillus vicinus* Peters, Mon.-ber. Kön. Akad. Wiss. Berlin, 1878, p. 200. (Kitui, Ukamba, British East Africa; type in Berlin Museum.)
1906. *Tatera mombasæ* Wroughton, Ann. and Mag. Nat. Hist., ser. 7, vol. 17, p. 493. May. (Takangu, British East Africa; type in British Museum.)
1910. *Tatera mombasæ* Roosevelt, African Game Trails, Amer. ed., p. 472; London ed., p. 484.

Specimens.—Sixty-one, from localities as follows:

British East Africa: Changamwe, 8, including 3 in alcohol (Mearns); Maji-ya-chumvi, 10 (Heller); Mariakani, 1 (Heller); Mazeras, 28 (Heller); Mount Sagalla, 1 (Heller); Mtoto Andei, 13, including 3 in alcohol (Heller).

I am unable to distinguish by any characters whatever specimens from the coast region near Mombasa from specimens collected at Mtoto Andei, which are presumably typical of *vicina*. Mtoto Andei is in the same kind of country as is Kitui, the type locality of *vicina*. An intensity of color would naturally be looked for in the coast specimens, but these are not darker on the average than skins from farther inland. There is a remarkable variation in the color of the tails in the entire lot. Some are entirely blackish on the terminal third, have a broad stripe of dark brown above, and a narrow stripe below, so that the light brownish colored area below is much restricted. Others have only a narrow stripe of brown along the upper side and have the entire under side light buffy. Between these extremes are all degrees of variation.

Mearns records the color of the iris as dark brown. Heller gives records of embryos as follows: Maji-ya-chumvi, December 10, five; December 12, five. Heller's manuscript notes on the type-specimen of *Gerbillus vicinus* Peters in the Berlin Museum are as follows:

> Type, 5273, Kitui (Coll. Hildebrandt). Marked in Peter's writing with name, and no doubt the type. Skull with only rostrum and molars intact; braincase broken badly. One other specimen mounted, but skull of this only represented by tip of rostrum with incisors.

TATERA VICINA POTHÆ Heller.

Plate 12,

1910. *Tatera pothæ* Heller, Smithsonian Misc. Coll., vol. 56, No. 9, p. 2. July 22. (Potha, Kapiti Plains, British East Africa; type in U. S. Nat. Mus.)
1910. *Tatera pothæ* Roosevelt, African Game Trails, Amer. ed., pp. 472, 476; London ed., pp. 484, 488.

Specimens.—Thirty, from localities as follows:

British East Africa: Kapiti Plains, 10, including three in alcohol (Loring); Suswa Plains, 1 (Heller); Ulukenia Hills, 19, including 5 in alcohol (Loring).

This is a very slightly differentiated subspecies. In color it is almost precisly as in true *vicina*, but the tail is lighter colored and apparently never becomes blackish as in the coast form. In African Game Trails, Roosevelt and Heller say of this form:

> Common on the Athi Plains, in open ground at the foot of the hills. Live in short grass, not bush. Nocturnal. Live in burrows, each burrow often possessing several entrances, and sometimes several burrows, all inhabited by same animal, not communicating.

Loring found four embryos, each 17 mm. long, in a female collected November 28 at Ulukenia Hills.

TATERA VICINA ICONICA Dollman.

1911. *Tatera iconica* Dollman, Ann. and Mag. Nat. Hist., ser. 8, vol. 7, p. 521. May. (Nyama Nyango, Northern Guaso Nyiro; type in British Museum.)

Specimens.—Seventeen, from the following localities:

British East Africa: Isiola River, 3 in alcohol (Heller); Mount Gargues, 4 (Heller); Mount Lololokwi, 2 (Heller); Northern Guaso Nyiro River, 8, including 4 in alcohol, (Heller).

This is another slight color subspecies of *T. vicina*. There appear to be no skull characters to distinguish it from true *vicina* or from *pothæ*, and the color difference is only average. Certain specimens almost exactly match in every detail specimens of *vicina*, but the series as a whole appears slightly paler with less indication of a darker dorsal area.

TATERA NIGRICAUDA NIGRICAUDA (Peters).

1878. *Gerbillus nigricaudus* Peters, Mon.-ber. Kön. Akad. Wiss. Berlin, 1878, p. 200. (Ndi, Taita, British East Africa; type in Berlin Museum.)

Specimens.—Four, from localities as follows:

British East Africa: Maji-ya-chumvi, 1 (Heller); Mtoto Andei, 2, including 1 in alcohol (Heller); Voi, 1 (Heller).

Notwithstanding the great difference in the color of the tail between typical examples of *nigricauda* and *vicina*, there are numerous young examples which have been placed with the series of *vicina* which might equally well be supposed to belong under *nigricauda*. I can find no characters whatever to separate the two species except the color of the tail, and as shown under remarks on *Tatera vicina vicina* there is almost every intermediate stage in color pattern between the lightest and darkest colored tails in that form; and the step to the totally black tail of "*nigricauda*" is small.

The greatest skull length of Peters's type-specimen is given as 49 mm., and Wroughton records a specimen in the British Museum with a greatest skull length of 52 mm. These measurements far exceed the dimensions of any specimen in our collection; the longest skull before me measures 41.5 in greatest length, but this specimen is a female with teeth only moderately worn and might somewhat exceed these measurements if older. No really old male skulls are in the collection, and I am consequently unable to determine to my own satisfaction the status of *nigricauda* and *vicina*, but I shall not be surprised if later some worker with more adult material than seems at present available, combines the two in a single species, which would take the name *nigricauda*.

Heller's notes on the type-specimens of *Gerbillus nigricaudus* Peters, which he examined at Berlin, are as follows:

> Skull No. 5278, Taita (Coll. Hildebrandt). Skin destroyed by insects and thrown away. Skull perfect, except one zygomatic arch gone.

TATERA NIGRICAUDA NYAMA Dollman.

1911. *Tatera nigricauda nyama* DOLLMAN. Ann. and Mag. Nat. Hist., ser. 8, vol. 7, p. 522. May. (Nyama Nyango, Northern Guaso Nyiro, British East Africa; type in British Museum.)

Specimens.—Nineteen, from localities as follows:

BRITISH EAST AFRICA: Archer's Post, 2 (Heller); Isiola River, 8 (Heller); Lakiundu River, 2 (Heller); Mount Gargues, 1 (Heller); Orr Valley, Mount Nyiro, 6 (Percival).

I find it equally hard to separate satisfactorily specimens of this form from *Tatera vicina iconica*, as with the case of *nigricauda* and *vicina* of eastern British East Africa. There are no very old skulls of males in the series which may account for my trouble, but I have been unable to find any character other than the rather unsatisfactory one of relative amount of black in the coloration of the tail to distinguish *nyama* from *iconica*.

The specimens from Orr Valley are much paler, more rusty colored than the skins from the Northern Guaso Nyiro region, but are apparently in a different state of pelage and are hardly comparable. They were collected in March and early April while the Guaso Nyiro skins were taken in July and September. Skins taken at the same season might show the animals from the two localities to be slightly different. A subspecies from a comparatively short distance to the north on the Sagan River, Bodessa, southern Abyssinia, was recently described by Frick as *Tatera nigricauda bodessæ*.[1]

TATERA NIGRICAUDA PERCIVALI Heller.

Plate 13.

1914. *Tatera nigracauda* (sic) *percivali* HELLER, Smithsonian Misc. Coll., vol. 63, No. 7, p. 8. June 24. (Lorian Swamp, British East Africa; type in U. S. Nat. Mus.)

Specimen.—One, the type, from—

BRITISH EAST AFRICA: Lorian Swamp (Percival).

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[1] Ann. Carnegie Museum, vol. 9, p. 14. June 6, 1914.

I can add no information regarding the status of this form beyond what is given in the original diagnosis. The type-specimen, a rather young adult female, is considerably paler, more buffy, than any specimen of *Tatera n. nyama* in the collection, and the form will doubtless stand as a color subspecies of the *vicina-nigricauda* group.

TATERA LIODON DUNDASI Wroughton.

1909. *Tatera dundasi* WROUGHTON, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 539. December. (Kirui, Mount Elgon, British East Africa; type in British Museum.)

Specimens.—Two, as follows:

BRITISH EAST AFRICA: Nzoia River, Guas Ngishu Plateau (Heller).

TATERA LIODON SMITHI Wroughton.

1909. *Tatera smithi* WROUGHTON, Ann. and Mag. Nat. Hist., ser. 8, vol. 3, p. 249. March. (Mubende, Unyoro, Uganda, type in British Museum.)

Specimens.—Fifteen, from localities as follows:

UGANDA: Kikandwa, 1 (Loring); Kikonda, 5 (Loring); Kisimbiri, 2 (Loring); Kisingo, 3 (Loring); Lialo, 1 (Loring).

BRITISH EAST AFRICA: Kaimosi, 3 (Heller).

Closely related to *dundasi.*

TATERA NIGRITA Wroughton.

1906. *Tatera nigrita* WROUGHTON, Ann. and Mag. Nat. Hist., ser. 7, vol. 17, p. 491. May. (Masindi, Unyoro, Uganda, type in British Museum.)

1910. *Tatera nigrita* ROOSEVELT, African Game Trails, Amer. ed., p. 472; London ed., p. 484.

Specimen.—One, as follows:

UGANDA: Kisimbiri (Loring).

Specimens of this small, dark *Tatera* might easily be mistaken for the young of the larger *Tatera liodon smithi,* which occurs at the same localities.

TATERA MACROPUS (Heuglin).

1864. *Meriones macropus* HEUGLIN, Nov. Act. Acad. Caes. Leop.-Car. Germ. Nat. Cur., Dresden, vol. 31, Article 7, p. 9. (Between Djur and Kosanga Rivers, Bongò, Sudan.)

Specimens.—Eight, as follows:

LADO: Rhino Camp, 1 skull only (Loring).

UGANDA: Ledgus, 1 (Loring); Lombeki River, 1 (Loring); Nimule, 5, including 1 in alcohol (Heller, Loring).

These specimens have been compared in London by Heller with skins from Bor, Sudan, identified as *Tatera macropus.* The form represented is in color very much like *Tatera liodon smithi* from farther south in Uganda, but is less dark. The skulls are much as in *smithi,* but have decidedly lighter colored incisors which show deeper grooves on the face than usual in *smithi.*

Measurements of specimens of Tatera.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Ear.	Skull: Condylobasal length.	Zygomatic breadth.	Length nasals.	Length auditory bulla.	Mandible.	Upper tooth row.	Lower tooth row.	Observations.
T. v. vicina.														
B. E. A.:														
Mazeras	183960	Male	135	170	35	21	35.9	19.3	17.2	11.4	21.3	6.5	6.2	Teeth moderately worn.
Do	183963	...do	160	186	37	19	38.0	21.7	18.7	11.7	22.3	7.2	6.8	Do.
Do	183981	...do	150	188	38	22	38.2	19.8	18.5	11.3	23.5	7.0	6.7	Do.
Do	183982	...do	150	188	37	22	38.0	20.8	17.8	11.7	23.3	6.8	6.8	Do.
Do	183984	...do	148	178	37	22	36.6	19.7	18.0	10.9	22.3	7.0	6.8	Do.
Do	183971	Female	145	185	35	21	36.5	19.7	16.7	10.6	22.1	6.8	6.5	Do.
Do	183972	...do	145	173	37	21	36.2	19.8	17.1	11.5	21.7	6.9	6.8	Do.
Do	183983	...do	150	168	36	20	35.7	19.5	17.3	10.9	22.0	7.1	6.3	Do.
Do	183985	...do	160	188	38	21	39.4	21.5	19.5	11.8	23.6	7.4	6.7	Teeth considerably worn.
Mariakani	183999	Male	150	178	36	20	36.9	19.5	16.5	10.8	22.2	7.1	6.5	Teeth moderately worn.
Maji-ya-chumvi	183993	...do	145	177	35	21	37.5	20.9	18.2	10.9	22.4	6.6	6.2	Do.
Do	183997	...do	160	....	40	23	....	....	19.4	....	25.0	7.3	7.2	Teeth much worn.
Do	183994	Female	165	197	37	21	39.6	21.0	19.2	11.4	24.0	6.8	6.7	Do.
Do	183998	...do	142	175	35	20	36.0	18.8	16.6	10.5	21.6	6.7	6.6	Teeth moderately worn.
Mount Sagalla	183988	Male	130	170	35	20	34.4	18.7	16.5	10.8	20.5	6.3	6.0	Do.
Mtoto Andei	181697	...do	160	171	36	22	38.9	20.9	18.1	11.0	23.7	6.8	6.3	Do.
Do	181701	Female	160	174	35	20	40.0	21.3	19.7	11.4	23.6	6.2	6.4	Teeth much worn.
Do	181707	...do	150	178	34	22	37.3	20.3	18.5	10.8	22.7	6.7	6.3	Teeth moderately worn.
Do	181709	...do	150	183	35	22	37.4	20.2	17.3	10.7	21.7	6.5	6.0	Do.
T. v. pothæ.														
B. E. A.:														
Ulukenia Hills	163414	Male	148	194	36	....	36.5	20.1	17.4	11.0	22.0	6.0	7.0	Teeth considerably worn.
Do	163415	...do	146	184	35	....	36.1	20.0	18.0	10.5	21.8	6.7	6.6	Do.
Do	163413	Female	145	171	34	....	36.7	19.9	18.1	11.2	21.8	6.5	5.9	Teeth moderately worn.
Do	163421	...do	158	188	37	....	37.7	19.0	17.6	11.7	22.8	6.6	6.2	Do.

Measurements of specimens of Tatera—Continued.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Ear	Skull: Condylobasal length.	Zygomatic breadth.	Length nasals.	Length auditory bulla.	Mandible.	Upper tooth row.	Lower tooth row.	Observations.
T. v. pothæ—Continued.														
B. E. A.—Continued.														
Kapiti Plains	161718	Male	145	192	37	....	37.5	20.4	18.5	10.8	22.8	6.8	6.1	Teeth moderately worn.
Do	161712	Female	130	132	35	....	36.8	20.2	17.3	10.8	21.7	6.8	6.5	Do.
Do	161714	...do	142	182	36	....	37.3	20.4	18.0	11.3	22.3	6.7	6.3	Do.
Do	[1]161716	...do	152	203	35	....	39.0	21.2	19.6	11.7	23.3	6.8	6.0	Do.
Do	161717	...do	143	181	35	....	36.4	20.2	17.5	10.7	22.3	6.7	5.9	Do.
T. v. iconica.														
B. E. A.:														
Mount Gargues	183950	Male	140	190	36	23	35.4	20.2	17.1	10.7	21.8	6.7	6.3	Do.
Do	183953	...do	145	195	36	23	37.9	20.7	18.5	11.3	22.8	6.5	6.1	Do.
Do	183951	Female	130	191	34	23	35.2	19.8	17.4	10.3	21.5	6.7	6.2	Do.
Do	183952	...do	145	183	36	21	36.5	19.7	17.5	11.0	22.1	6.4	6.3	Do.
N. Guaso Nyiro	183953	Male	138	188	36	21	35.2	19.4	16.8	10.3	20.9	6.1	6.0	Do.
T. n. nigricauda.														
B. E. A.:														
Voi	183946	Female	145	183	37	22	37.7	20.8	17.5	11.4	22.8	6.8	6.8	Do.
Maji-ya-chumvi	183947	Male	140	175	37	....	35.3	18.9	16.4	10.4	21.4	6.5	6.4	Teeth little worn.
T. n. nyama.														
B. E. A.:														
Orr Valley	183933	Female	134	182	35	22	35.1	19.2	16.3	10.9	21.6	6.4	6.3	Teeth moderately worn.
Mount Gargues	183944	Male	155	177	38	25	39.4	23.2	19.1	12.3	23.9	6.9	6.5	Do.
Lakiundu River	183943	...do	150	204	37	21	37.9	20.2	19.3	11.0	23.0	6.5	6.0	Do.
Isiola River	183938	...do	140	178	36	20	35.4	19.4	17.2	11.0	21.4	6.1	5.7	Teeth little worn.
Do	183934	Female	140	196	37	21	37.3	20.4	17.7	11.8	22.1	6.8	6.0	Teeth moderately worn.
Do	183937	...do	150	191	37	21	36.7	20.5	17.8	11.0	22.6	6.7	6.8	Do.
T. n. percivali.														
B. E. A.: Lorian Swamp	[1]183945	...do	133	170	35	21	35.8	19.6	16.7	10.9	21.6	6.5	6.2	Do.

T. l. dundasi.													
B. E. A.:													
Nzoia River	163409	Male	175	172	38	22	41.0	22.1	17.6	12.3	25.3	7.3	7.3	Teeth considerably worn.
Do.	163408	Female	170	161	37	21	39.1	20.2	16.5	11.4	24.8	7.4	7.4	Do.
T. l. smithi.													
Uganda:													
Kikonda	165302	Male	178	160	34	17	38.9	20.8	16.4	11.3	24.4	7.4	7.5	Teeth moderately worn.
Do.	165303	...do.	157	·143	32	18	37.7	19.6	16.0	10.6	22.5	6.6	6.3	Do.
Do.	165304	Female	169	159	34	19	39.6	21.9	17.8	11.6	24.7	7.3	7.3	Teeth much worn.
Do.	165305	...do.	165	169	35	17	38.8	21.2	16.7	11.7	24.5	7.3	7.2	Teeth moderately worn.
Do.	165306	...do.	163	162	34	18	38.3	20.8	16.8	11.2	23.8	7.1	7.4	Do.
Lialo	165301	...do.	158	163	34	15	38.2	20.4	16.2	11.5	23.8	7.5	7.3	Do.
Kisingo	165299	Male	163	170	36	....	38.7	20.3	16.8	11.5	24.2	7.2	7.2	Do.
Do.	165300	...do.	169	178	35	16	38.4	19.8	16.8	11.4	23.8	7.3	7.2	Do.
Do.	165298	Female	153	158	34	18	36.7	20.4	15.3	11.3	22.8	7.1	7.2	Do.
B. E. A.: Kaimosi	183925	...do.	140	168	33	20	37.5	20.2	16.2	11.3	23.3	7.2	7.2	Do.
T. nigrita.													
B. E. A.: Kisimbiri	165294	...do.	142	140	32	14	32.4	....	13.8	10.1	19.2	6.8	6.8	Do.
T. macropus.													
Uganda:													
Nimule	165291	...do.	140	142	35	20	34.0	18.7	13.7	10.2	21.6	6.9	7.0	Teeth little worn.
Do.	165292	...do.	165	162	34	21	33.7	21.7	16.5	11.3	24.2	7.3	7.4	Teeth considerably worn.
Do.	165293	...do.	150	145	36	21	36.2	19.2	14.5	11.1	21.4	7.2	7.1	Teeth moderately worn.
Lombeki River	165309	...do.	137	136	33	....	35.7	18.1	15.2	11.0	21.6	7.0	7.0	Do.
Ledgus	165307	...do.	160	162	34	....	37.4	20.0	16.2	11.3	23.4	6.8	6.9	Do.
T. robusta.													
Sudan: Naikhala	141501	Male	123	170	33	17	33.0	18.1	15.7	10.4	19.9	5.9	5.4	Do.
T. b. varia.													
B. E. A.:													
So. Guaso Nyiro River	[1]162249	...do.	169	239	43	....	42.0	24.0	19.7	11.4	26.8	7.6	7.3	Teeth much worn.
Do.	162251	...do.	163	227	43	....	38.7	23.1	17.3	11.4	25.4	7.4	7.3	Teeth moderately worn.
Do.	162253	...do.	168	....	43	....	39.6	23.3	17.5	11.1	25.5	7.2	7.0	Do.
Do.	162250	Female	185	227	44	....	41.5	23.9	18.6	11.5	27.4	8.3	7.6	Teeth much worn.
Do.	162269	...do.	170	228	43	....	41.0	24.4	17.9	11.5	26.8	7.3	7.3	Do.
Do.	162272	...do.	192	236	44	....	41.7	24.7	18.9	11.9	27.7	7.8	7.3	Do.

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[1] Type.

The single odd skull from Rhino Camp, Lado, is younger than any specimen from Uganda, but appears to represent the same form. It is really of little importance except to prove the presence of some species of *Tatera* at that locality. A form of the *liodon* group has been described by Thomas from the upper Welle River, Congo, as *Tatera dichrura*.[1] This locality is comparatively near to Lado, but is in the Congo drainage and it is probably doubtful if *dichrura* extends into the Nile watershed at Rhino Camp, although certain large mammals cross the low divide.

It would not be surprising, in view of the close resemblance, if the form here under consideration was found eventually to intergrade with *Tatera liodon smithi* along the east side of Albert Nyanza.

TATERA ROBUSTA (Cretzschmar).

1826. *Meriones robustus* CRETZSCHMAR, Atlas Reise nördl. Afrika von Rüppell, vol. 1, p. 75, pl. 29, fig. *b*. (Ambukol, Sudan; type in Frankfort Museum.)
1902. *Tatera robustus* ANDERSON, Zool. Egypt, Mamm., p. 265.
1905. *Tatera robustus* SCHWANN, Nov. Zool., vol. 12, p. 2. January.
1906. *Tatera robusta* WROUGHTON, Ann. and Mag. Nat. Hist., ser. 7, vol. 17, p. 494. May.

Specimen.—One, as follows:

SUDAN: Naikhala (Rothschild).

TATERA BÖHMI VARIA Heller.

Plate 12.

1910. *Tatera varia* HELLER, Smithsonian Misc. Coll., vol. 56, No. 9, p. 1. July 22. (Southern Guaso Nyiro River, British East Africa; type in U. S. Nat. Mus.)
1910. *Tatera varia* ROOSEVELT, African Game Trails, Amer. ed., pp. 472, 476; London ed., pp. 484, 488.

Specimens.—Thirty, including one in alcohol, as follows:

BRITISH EAST AFRICA: Southern Guaso Nyiro River (Loring, Heller).

This splendid series contains specimens of all ages from young in the first pelage to old adults. The juvenile coat is dark and glossy, much darker than in adults; this is followed by a paler post-juvenile pelage of dull grayish buff which is quite different from the brighter coat of adults. The species belongs to the subgenus *Gerbilliscus*.

Lives in the open plains, among the grass; not among bushes, nor at foot of hills. Lives in burrows, one animal apparently having several, each burrow with a little mound at the entrance. Nocturnal. (Roosevelt, African Game Trails, Amer. ed., p. 476.)

Genus LOPHIOMYS Milne-Edwards.

1867. *Lophiomys* MILNE-EDWARDS, L'Institut, vol. 35, p. 46. February 6. (*L. imhausii*.)
1867. *Phractomys* PETERS, Zeitsch. Naturw. Halle, vol. 29, p. 195. February. (*L. æthiopicus*.)

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 16, p. 147. August, 1915.

Although a few specimens of the maned rat find their way into collections from time to time, the animal is still so rare that no suitable series are available for study. If all the collections in various museums were combined it would still be impossible to form any correct idea of the relationships of the named forms, and it will doubtless be many years before sufficient material has accumulated. All the forms known from British East Africa are represented in our collection, with the exception of *Lophiomys testudo* Thomas from Ravine Station, the type-specimen of which remains to this date unique.

For measurements of specimens of *Lophiomys* see table, page 39.

LOPHIOMYS BOZASI Oustalet.

1902. *Lophiomys bozasi* Oustalet, Bull. Mus. Hist. Nat. Paris, 1902, p. 400. (Goba, southern Abyssinia; type in Paris Museum.)

1910. *L[ophiomys] bozasi* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 6, p 223. August.

Specimen.—One, as follows:

Abyssinia: Let Marefia, Shoa (Ragazzi).

Mr. Thomas believes that this form will prove to be identical with *L. æthiopicus* Peters, the type-specimen of which came from Maman, Sudan.

LOPHIOMYS THOMASI Heller.

Plate 14.

1912. *Lophiomys thomasi* Heller, Smithsonian Misc. Coll., vol. 59, No. 16, p. 4. July 5, 1912. (Mount Gargues, Mathews Range, British East Africa, 6,000 feet; type in U. S. Nat. Mus.)

Specimens.—Three, as follows:

British East Africa: Mount Gargues (Heller).

Heller records the stomach contents of one specimen as leaves and seeds; of the two others leaves only.

This is a distinct species, with a much smaller skull than the neighboring forms, *bozasi* on the north and *hindei* on the south.

According to Heller's notes these three specimens were caught in rock crevices above permanent water in an old creek bed in rank, weedy vegetation. The two females were quite gentle and could be stroked after taken from the traps. They were slow and dazed in their movements but when disturbed made a series of faint puffs or sneezes, apparently to alarm the aggressor. The old male, however, bit savagely when irritated and made a coughy, sneezy bark when angry. Held by the tail they were unable to turn up and bite. Heller believes these *Lophiomys* to be strictly rock-dwellers, notwithstanding reports of their living in holes of trees. His captive specimens were apparently unable to climb and when placed in the fork of a tree soon fell out.

LOPHIOMYS IBEANUS IBEANUS Thomas.

Plate 2.

1910. *L[ophiomys] ibeanus* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 6, pp. 223 and 224. August. (Mile 513, Uganda Railway, between Londiani and Lumbwa stations, Mau region, British East Africa; type in British Museum.)

1910. *L[ophiomys] ibeanus ibeanus* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 6, p. 223. August.

1912. *Lophiomys ibeanus* BAKER, Smithsonian Misc. Coll., vol. 59, No. 9, p. 1, pl. 1: May 17.

Specimens.—Three, from localities as follows:

BRITISH EAST AFRICA: Naivasha Escarpment, 1 (Heller) Nakuru, 2, including one with complete skeleton (Goldfinch).

The two specimens from Nakuru were obtained alive by Mr. A. B. Baker of the National Zoological Park from Mr. G. H. Goldfinch, Assistant Game Warden of British East Africa. Mr. Baker has published some notes on these specimens, from which I extract the following:[1]

> This species of *Lophiomys* occurs in the higher part of British East Africa and is known only to the Wandorobo, a tribe of expert hunters, who explore every corner of the forests. Mr. Goldfinch was well aquainted with the game of that region and with its animals generally, but this one he knew only from descriptions given by the natives. At his urgent request they secured two specimens in the forest near Nakuru, at about 8,000 feet altitude. These he forwarded to Nairobi, whence they were shipped with the collection of animals which had been presented to the Park by Mr. W. N. McMillan of that place. One died at Port Said, while on the way to America, and the other came through safely.
>
> Mr. Goldfinch states that *Lophiomys* is arboreal and lives in the thick forest of the high country, feeding on leaves and tender shoots, also that the natives are averse to handling the animal, believing its bite to be poisonous. It is, he says, "very rare or only got by accident here." In captivity it eats cabbage, sweet potatoes, and other vegetables, and is especially fond of sweet potato leaves and the endive salad plant. It is strictly nocturnal, and its slow movements are very suggestive of the Canada porcupine (*Erethizon dorsatus*).

From Heller's experience with *Lophiomys thomasi* and the fact that the Naivasha Escarpment specimen of *L. ibeanus* was snared in the rocks, on hyrax runways on a cliff, it seems probable that the story of the arborial habits of *Lophiomys* is a myth.

LOPHIOMYS IBEANUS HINDEI Thomas.

1910. *L[ophiomys] i[beanus] hindei* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 6, p. 223. August. (Mutaragwa, Aberdare Mountains, British East Africa; type in British Museum.)

Specimen.—One skull as follows:

BRITISH EAST AFRICA: West side of Mount Kenia at 8,500 feet (Loring).

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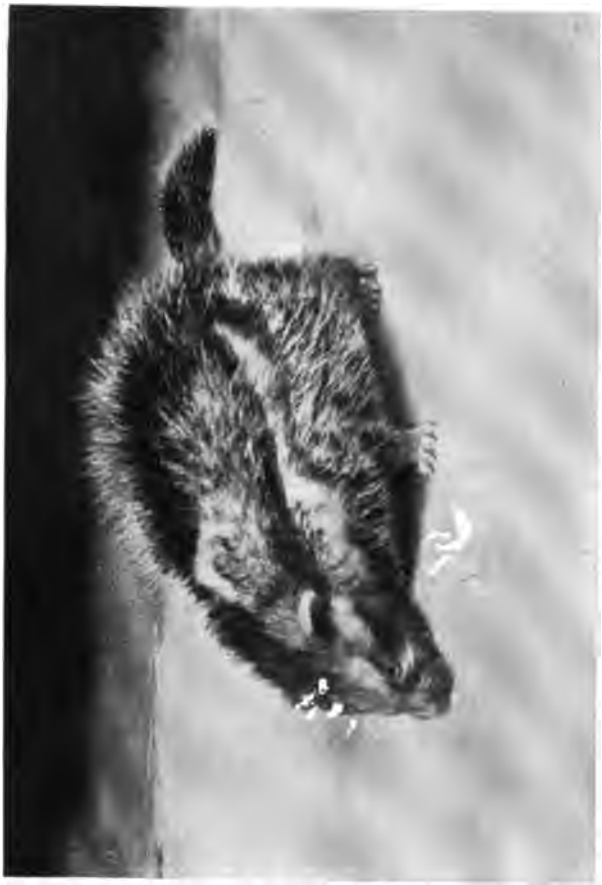
[1] Smithsonian Misc. Coll., vol. 59, No. 9, p.2. May 17, 1912.



EAST AFRICAN MANED RAT.

FOR EXPLANATION OF PLATE SEE PAGE 171.

Measurements of specimens of Lophiomys.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Skull: Condylobasal length.	Greatest breadth.	Median length nasals.	Mastoid breadth.	Interorbital breadth.	Mandible.	Upper tooth row, alveoli.	Lower tooth row, alveoli.	Condition of teeth
L. bozasi.														
Abyssinia:														
Let Marefia	25465	Male				66	41.9	24.7	25.8		41.7	14.1	13.1	Moderately worn.
L. thomasi.														
B. E. A.:														
Mount Gargues	[1] 181789	...do...	270	165	41	58	37.1	20.4	22.3	14.4	36.3	13.2	11.8	Do.
Do.	184114	Female	275	155	44	54	35.4	19.7	21.9	13.6	36.2	12.8	12.8	Little worn.
Do.	184115	...do...				54	36.7	18.4	22.5	13.2	36.1	13.2	12.5	Do
L. i. ibeanus.														
B. E. A.:														
Nakuru	155360	Male	292	215	51	61	39.5	22.8	22.7	14.8	39.6	12.9	12.4	Moderately worn.
Do.	172694	...do...				60	39.1	22.1	23.5	14.8	40.7	13.5	12.8	Do.
Naivasha Escarpment	164571	...do...				60		21.4	21.8	14.0	38.8	12.8	12.2	Do.
L. i. hindei.														
Mount Kenia	200952						41.1			16.1		12.8		Do.

[1] Type.

On account of its large size I have referred this specimen to *hindei*, although I quite agree with Doctor Lönnberg's statement that "it appears hardly possible to maintain *L. i. hindei* as a subspecies as it only differs in size,"[1] and the specimen recorded by him from the Mau Escarpment (the type region of *ibeanus*) exceeds in cranial dimensions the type of *hindei*. The large masseteric knob which has been given as a specific character of *ibeanus* is characteristic of the old male, and is wanting in young adult male and adult female skulls in our collection. Sufficiently large series of skulls of *Lophiomys* to work out the ordinary individual variation and the increase in size with age are greatly desired.

Family RHIZOMYIDÆ.

Genus TACHYORYCTES Rüppell.

[1835.] *Tachyoryctes* Rüppell, Neue Wirbelth. Fauna Abyssinien gehorig. Säug., p. 35. 1835–1840. (*T. splendens*.)

1843. *Chrysomys* Gray, List Mamm. British Museum, p. 150. (*T. splendens*.)

The United States National Museum collection contains eight forms of the East African mole-rat. While these are all closely related species, all have constant characters of differentiation, and intergradation between any two of them is not indicated by this material. There is in no case any doubt as to where any given specimen should be listed. When collections have been made over all parts of British East Africa and Abyssinia numerous forms will doubtlessly be connected by complete chains of intergrades and the final monographer of the genus will be obliged to reduce many of the named forms to the rank of subspecies. Six currently recognized forms are not represented in our collection. These are *splendens* Rüppell, 1835, and *macrocephalus* Rüppell, 1845, from Abyssinia; *annectens* Thomas, 1891, doubtfully from Lake Naivasha; *badius* and *storeyi* Thomas, 1909, from Eldoma Ravine and Lake Elmenteita, British East Africa; and *somalicus* Osgood, 1910, from Somaliland. The species described by Thomas in 1891, *annectens*, is larger than any form in our collection excepting *rex* of Mount Kenia; its type locality seems to be in question, but the specimen on which the name is based is supposed to have been collected somewhere in the vicinity of Lake Naivasha. All of our specimens from Lake Naivasha belong to a much smaller species described by Thomas in 1909 from the same region.

The examination of large series of specimens of *Tachyorctes* proves the utter lack of value of certain skull characters which have ordinarily been used in diagnosing new species. The shape of the nasal bones, for example, is so variable that skulls in almost any series exhibit the entire range of variation usual in the genus. The presence of conspicuous concavity, or a sharply marked reentrant curve on the outer lateral margin is purely individual and is not even an average character of value in differentiating forms.

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[1] Kungl. Sv. Vet. Akad. Handl., vol. 48, No. 5, p. 101. 1912.

Skins of females average darker than those of males in all species of mole-rats represented in the United States National Museum collection except *Tachyoryctes spalacinus*.

In the table of measurements of specimens of this genus, dimensions of old adult examples only are given, the oldest animals in each series having been selected for this purpose. The majority of specimens in collections are rather young.

TACHYORYCTES RUDDI Thomas.

1909. *Tachyoryctes ruddi* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 546. December. (Kirui, Mt. Elgon, British East Africa; type in British Museum.)

Specimens.—Thirty-seven, as follows:

BRITISH EAST AFRICA: Kaimosi, 2 in alcohol (Heller); Kakumega, 32 (Heller); Lukosa River, 3 (Heller).

This is the darkest species of *Tachyoryctes* in the collection. All of the young examples are intense black and a large proportion of the fully adult specimens are very dark blackish-brown or nearly black. As with other forms the females average darker than the males. Two nursing young were collected at Kakumega, February 16. Two adult females from the same place, February 15 and 16, each contained one embryo.

TACHYORYCTES REX Heller.

Plate 15.

1910. *Tachyoryctes rex* HELLER, Smithsonian Misc. Coll., vol. 56, No. 9, p. 4. July 22. (Western slope of Mount Kenia, 10,000 feet; type in U. S. Nat. Mus.)

1910. *Tachyoryctes rex* ROOSEVELT, African Game Trails, Amer. ed., pp. 473, 485; London ed., pp. 485, 496.

Specimens.—Forty-nine, as follows:

BRITISH EAST AFRICA: Mount Kenia, west side, 49, including 2 in alcohol (Loring, Mearns).

These specimens were all collected at an altitude of from 9,000 to 10,700 feet. Mr. Heller says:

> This is an extremely abundant species on Mount Kenia, where it inhabits a narrow zone at the upper edge of the bamboo forest where the moorland country first makes its appearance. The species is not found immediately below this area in the bamboo or yew forests, but another species appears on the grassy plains at the base of the mountain.[1]

Mr. Loring, who collected most of the specimens, has the following note on *Tachyoryctes* in Colonel Roosevelt's African Game Trails:[2]

> Mole-rat mounds were common about the West Kenia Forest Station, but none were seen between 7,500 and 8,500 feet, and from this altitude they ranged to 11,000 feet.

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[1] Smithsonian Misc. Coll., vol. 56, No. 9, p. 4. July 22, 1910.

[2] Appendix C, pp. 485, 486. 1910.

> They inhabited all of the open grassy plots in the bamboo belt and in the open timber. The 'boys' snared many in nooses ingeniously placed in the runs that were opened and closed after the trap was set. While digging into the burrows, several times I found bulky nests of dried grass in side pockets just off the main runway. Most of them were empty, but one was filled with the animals' droppings.

This large, fluffy-haired mole-rat is obviously closely related to *Tachyoryctes audax* of the Aberdare Range, but exceeds the latter greatly in dimensions. The colors are much the same in the two species, but adult skulls of *rex* are very much larger than skulls of *audax*. There is more than ordinary difference in size of skulls of the sexes; female skulls are much smaller. Young examples are usually quite blackish and often have irregular blotches of white on the underparts. Loring records a female with one large embryo, October 5. Doctor Mearns notes the color of the iris as dark grayish brown.

The excellent series of forty-seven skulls of this species shows to good advantage the change in size of the teeth with age. A long suite of skulls having been laid out according to age, as judged by various characteristics of the skull and teeth, it is seen that there is a great change in the crown area of the molars during the animal's life. At first the actual crown area is small; it gradually increases in size with wear until a maximum is reached at about the time the external reentrant angle disappears from the pattern. There is then a gradual decrease in crown area; when old age is reached the size of the tooth again appears to be about as in the young adult period. In describing new forms as "smaller toothed" or "larger toothed," material should be compared with specimens of exactly the same age.

TACHYORYCTES SPALACINUS Thomas.

1909. *Tachyoryctes spalacinus* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 547. December. (Embi, near Mount Kenia, British East Africa; type in British Museum.)

Specimens.—Forty-one, from localities as follows:

British East Africa: Nyeri, 1 (Loring); two day's journey east of Nyeri, 1 (T. Roosevelt); Wambugu, 39, including 1 in alcohol (Loring, Mearns).

As in related species all skins of very young animals in this series are wholly black. There is little or no average difference in the color of the sexes in our series of *spalacinus;* the species differs in this respect from all other forms of *Tachyoryctes* represented in the United States National Museum collection. The species is a handsome one, rich and dark in color. The skin of one old adult male is entirely black, like the skins of young animals. A conspicuous specific skull character is found in the upper incisors, which protrude far forward. Mearns records the mammæ as $\frac{2}{2}-\frac{0}{0}-\frac{2}{2}=4$ pairs.

TACHYORYCTES AUDAX Thomas.

1910. *Tachyoryctes audax* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 421. May. (Aberdare Range, British East Africa, 10,000 feet; type in British Museum.)

Specimens.—Twenty-two, as follows:

British East Africa: Aberdare Mountains, summit, 11,000 feet, 15 (Heller); Aberdare Mountains, 9,100 feet and 10,500 feet, 3, including one in alcohol (Heller); Changongorra, Aberdare Range, 1 (Heller); Mayo River, 3 (Heller).

This large, pale mole-rat looks much like *Tachyoryctes rex* of Mount Kenia, but is smaller. In the series of 21 skins there are only two blackish specimens, both of which are young.

TACHYORYCTES NAIVASHÆ Thomas.

1909. *Tachyoryctes naivashæ* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 547. December. (Lake Naivasha, British East Africa; type in British Museum.)

1910. *Tachyoryctes annectens* Roosevelt, African Game Trails, Amer. ed., p. 473; London ed., p. 485. (Not of Thomas.)

1910. *Tachyoryctes splendens ibeanus* Roosevelt, African Game Trails, Amer. ed.; p. 485; London, ed., p. 496. (Not of Thomas.)

Specimens.—Eighty, from the following localities:

British East Africa: Deep Dale, Loita Plains, 1 (Heller); Kabalolot Hill, 1 (Heller); Kijabe, 9, including eight odd skulls (Heller, Mearns); Lake Naivasha, 32, including 3 in alcohol (Loring, Mearns, Heller); Loita Plains, 4 in alcohol (Heller); Naivasha Station, 17 (Loring, Mearns); Oljoro O Nyon, 7 (Loring); Salt Marsh, Sotik, 1 skull (Heller); Sibi River, Southern Guaso Nyiro, 1 (Heller); Suswa Plains, 7 (Heller).

Specimens from Sotik and the Southern Guaso Nyiro do not differ appreciably from specimens collected around Lake Naivasha. Mr. Dollman has recorded *naivashæ* from Lemek Valley.[1]

No example from this large series approaches in size the type of *Tachyoryctes annectens* (Thomas).[2] No definite type locality for *annectens* has ever been fixed so far as I can discover. In the original diagnosis the habitat is given as "either Masai-land or inland British East Africa." Specimens accompanying the type were labelled as collected at Mianzini, just east of Lake Naivasha, and this place has evidently been considered the type region by Thomas in later subdivision of the genus,[3] but I do not find that any later specimens have been referred to *annectens*. In all the United States National Museum collection of *Tachyoryctes* the only specimens which approach in size the type of *annectens* are the larger males of *T. rex* from Mount Kenia. There is an extraordinary difference in size of skulls between sexes in *T. naivashæ*, but the largest males fall far short of the dimensions given for the type skull of *annectens*.

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[1] Proc. Zool. Soc. London, 1914, p. 317. June, 1914.

[2] *Rhizomys annectens* Thomas, Ann. and Mag. Nat. Hist., ser. 6, vol. 7, p. 304, March, 1891; Proc. Zool. Soc. London, 1891, p. 186.

[3] Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 547. December, 1909.

Skins of females from Naivasha Station average darker than females from the south end of Lake Naivasha. Only one blackish skin is present in the large series of *naivashæ* examined; the color is very uniform throughout the lot, except for the usual sexual difference, females averaging noticeably darker than males.

Loring furnished the following notes on this species for African Game Trails:[1]

> Some 15 miles west of Lake Naivasha mole rats became common, and on the sandy flats within 5 miles of the lake they were so abundant that our horses broke into their runways nearly every step. Their underground tunnels and the mounds of earth that were thrown out were similar to those made by the pocket gophers of the western United States. Many were snared by the porters and brought to camp alive. They would crawl about slowly, not attempting to run away, but looking for a hole o enter. After the lapse of a few seconds they would begin to dig. In any slight depression they began work, and when small roots of a tussock of grass intervened, they used their teeth until the obstruction was removed, and then with the nails of their front feet only, continued digging. As the hole deepened they threw the dirt out between their hind legs and with them still further beyond. After the earth had accumulated so that it drifted back they faced about, and using their chest as a scoop, pushed it entirely out of the way. They were most active in the evening, at night, and in early morning. Several were found dead near their holes, having evidently been killed by owls or small carnivorous mammals.

TACHYORYCTES IBEANUS Thomas.

1900. *Tachyoryctes splendens ibeanus* THOMAS, Proc. Zool. Soc. London, 1900, p. 179. June 1. (Machakos, British East Africa; type in British Museum.)

1910. *Tachyoryctes splendens ibeanus* ROOSEVELT, African Game Trails, Amer. ed., pp. 473, 479; London ed., pp. 485, 490.

Specimens.—Fifty-five, as follows:

BRITISH EAST AFRICA: Kyambu, 3 native skins (Loring); Nairobi, 52, including 13 in alcohol (Mearns, Loring.)

This species shows the maximum difference in color between adult males and females; the females are very much darker. Several skins have large, irregular white blotches on the underparts. Very young specimens are usually entirely black.

TACHYORYCTES DÆMON Thomas.

1892. *Rhizomys splendens* TRUE, Proc. U. S. Nat. Mus., vol. 15, p. 464. (Not of Rüppell.)

1909. *Tachyoryctes dæmon* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 545. December. (Mount Kilimanjaro, East Africa, 5,000 feet; type in British Museum.)

Specimens.—Seven, as follows:

GERMAN EAST AFRICA: Marangu, Mount Kilimanjaro, 6 (Abbott); Mount Kilimanjaro, 5,000 feet, 1 (Abbott).

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[1] Roosevelt, African Game Trails, Appendix C, p. 485. 1910.

Measurements of specimens of Tachyoryctes.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Skull: Condylobasal length.	Zygomatic breadth.	Length of nasals.	Greatest breadth of nasals.	Length of bulla.	Mandible.	Upper tooth row, aveoli.	Lower tooth row, aveoli.	Observations.
T. ruddi.														
B. E. A.:														
Kakumega	184119	Male	180	70	27	45	29.7	16.6	6.1	10.2	30.9	8.7	9.5	Basal suture obliterated.
Do	184131	...do	190	78	29	46	33.0	19.1	6.3	10.6	32.9	8.4	9.3	Do.
Do	184146	...do	190	73	28	44	32.2	17.9	6.4	10.4	30.9	9.3	10.6	Do.
Do	184149	...do	190	57	26	45	31.0	17.0	5.9	9.9	31.6	9.8	10.3	Do
Do	184120	Female	190	76	29	46	32.0	18.1	5.8	10.8	31.8	8.6	10.0	Do.
Do	184132	...do	185	73	28	45	31.4	16.7	5.5	9.5	30.1	9.7	10.3	Do.
Do	184135	...do	180	70	27	44	30.2	17.5	5.8	9.7	30.9	9.8	9.8	Do.
Do	184147	...do	170	68	28	44	31.0	17.0	5.7	9.5	31.4	8.3	9.8	Do.
T. rex.														
B. E. A.:														
Mount Kenia	[1] 163088	Male	232	59	31	54	38.6	21.9	7.1	11.9	38.1	10.2	12.2	Basal suture open.
Do	163862	...do	225	68	31	53	37.8	20.6	6.7	11.5	37.3	11.1	12.6	Do
Do	163866	...do	252	68	32	54	37.5	22.5	7.3	12.4	37.1	10.3	11.9	Basal suture obliterated.
Do	198016	...do	235	70	30	53	37.5	22.3	6.8	11.7	36.0	9.7	10.9	Do.
Do	198017	...do	257	75	32	57	....	24.0	7.6	12.2	39.4	11.3	12.2	Do.
Do	198018	...do	268	80	31	56	38.1	....	8.3	12.4	38.8	10.6	12.0	Do.
Do	198019	...do	261	68	33	54	37.5	22.5	7.3	10.9	36.3	10.2	11.8	Do.
Do	163864	Female	229	68	29	51	36.4	20.0	6.3	10.6	35.8	10.3	13.0	Basal suture open.
Do	163868	...do	233	64	30	52	....	19.1	6.1	12.0	36.7	10.5	12.6	Basal suture obliterated.
Do	163871	...do	233	63	30	49	....	19.0	6.3	11.5	34.5	10.6	11.5	Do.
Do	163873	...do	233	68	32	51	35.2	20.1	6.6	11.5	36.1	11.2	12.7	Basal suture closed.
Do	163877	...do	227	64	31	52	34.8	20.0	6.5	10.9	36.5	11.0	12.7	Do.
Do	163892	...do	222	69	31	50	....	19.5	7.1	11.4	35.1	10.5	12.4	Do.
Do	163901	...do	224	54	31	47	33.6	18.3	5.4	9.8	32.8	10.4	11.4	Basal suture obliterated.

[1] Type.

Measurements of specimens of Tachyoryctes—Continued.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Skull: Condylobasal length.	Zygomatic breadth.	Length of nasals.	Greatest breadth of nasals.	Length of bulla.	Mandible.	Upper tooth row, aveoli.	Lower tooth row, aveoli.	Observations.
B. E. A.: *T. spalacinus.*														
Wambugu	163835	Male	224	64	28	47	32.6	17.5	6.0	10.3	31.2	8.7	9.8	Basal suture obliterated.
Do	163841	...do	227	72	30	48	31.7	17.8	6.2	10.3	31.9	9.1	9.9	Basal suture open.
Do	163856	...do	235	80	30	52	33.9	19.5	6.5	11.8	35.2	9.0	9.7	Basal suture obliterated.
Do	163904	...do	235	63	30	49	33.2	18.4	6.4	9.9	32.5	9.4	9.8	Basal suture closed.
Do	163908	...do	224	57	29	48	32.7	17.2	6.0	10.6	31.6	8.8	9.7	Basal suture open.
Do	163879	Female.	230	66	31	48	32.5	19.3	6.2	10.9	32.2	8.9	10.1	Basal suture closed.
Do	163903	...do	225	58	29	46	....	17.2	6.0	10.6	....	8.2	....	Basal suture obliterated.
B. E. A.: *T. audax.*														
Aberdare Mountains	163776	Male	225	65	....	51	36.3	21.5	7.8	10.5	34.5	10.1	10.8	Basal suture closed.
Do	184157	...do	200	63	28	48	33.5	20.4	6.4	10.4	32.6	10.3	10.3	Basal suture open.
Do	184161	...do	215	78	30	53	36.0	22.0	7.8	11.0	35.7	10.1	10.8	Basal suture obliterated.
Do	184163	...do	205	64	28	50	35.0	21.2	7.2	11.1	33.2	10.4	10.9	Do.
Do	163775	Female.	215	69	28	47	32.7	17.5	6.2	11.7	32.1	9.8	10.3	Basal suture closed.
Do	184158	...do	180	63	28	44	32.5	17.3	5.6	10.4	30.5	9.7	10.3	Basal suture open.
Do	184162	...do	205	66	29	49	34.8	20.1	7.3	10.8	33.2	10.5	11.8	Do.
Do	184165	...do	220	68	30	49	35.0	20.1	6.8	10.6	33.6	10.1	10.8	Do.
Do	184168	...do	220	....	28	46	34.1	18.3	6.3	10.3	32.0	10.6	11.2	Basal suture obliterated.
B. E. A.: *T. naivashæ.*														
Lake Naivasha	162769	Male	220	69	29	50	33.9	19.2	6.9	10.4	32.7	8.8	9.8	Basal suture open.
Do	162770	...do	215	72	29	50	34.6	19.5	6.5	10.8	33.5	9.6	10.4	Basal suture closed.
Do	162772	...do	216	79	29	49	34.8	20.2	6.6	10.2	33.1	9.7	10.7	Do.
Do	162776	...do	191	73	29	48	33.9	18.0	6.6	11.0	32.1	8.8	10.3	Do.
Do	162790	...do	228	75	29	51	34.6	18.3	6.8	11.2	35.0	9.2	10.7	Basal suture obliterated.
Naivasha Station	162817	...do	220	95	20	49	33.7	18.3	5.9	11.0	33.3	10.0	10.8	Do.
So. Guaso Nyiro	181608	...do	190	75	30	48	33.3	17.7	6.0	10.8	32.1	9.4	9.8	Do.
Suswa	181610	...do	210	60	28	48	34.2	17.3	5.9	12.2	33.0	9.8	10.5	Do.

Do.	181612	...do....	200	54	26	46	31.6	15.8	5.8	10.3	29.0	9.3	9.6	Do.
Lake Naivasha	162773	Female.	205	63	28	46	32.3	17.3	5.4	10.0	30.8	9.0	10.0	Basal suture closed.
Do.	162777	...do....	188	53	28	42	29.9	16.4	5.8	10.2	28.3	9.1	9.9	Do
Do.	162778	...do....	187	64	25	44	29.8	17.2	5.3	9.5	30.5	9.0	9.5	Do.
Do.	162779	...do....	192	71	28	45	31.5	17.1	5.5	10.9	30.6	9.3	9.9	Do.
Do.	162795	...do....	190	64	26	45	....	15.9	5.4	10.4	29.0	9.9	11.0	Basal suture obliterated.
Naivasha Station	162803	...do....	195	56	26	44	30.4	16.7	5.3	9.5	31.1	8.7	9.4	Basal suture closed.
Do.	162805	...do....	200	61	26	46	33.1	18.0	6.3	10.8	31.3	9.4	10.3	Basal suture obliterated.
Do.	162816	...do....	190	66	26	44	32.0	16.2	5.3	10.2	29.3	9.0	10.1	Basal suture open.
Oljoro O Nyon River	162764	...do....	195	55	27	42	30.5	15.8	5.7	9.8	28.7	8.8	9.4	Basal suture closed.
B. E. A.: *T. ibeanus.*														
Nairobi	163791	Male....	220	73	30	46	32.3	18.2	6.3	11.1	30.8	8.5	9.4	Basal suture obliterated.
Do.	163807	...do....	209	63	29	47	31.8	18.9	6.1	10.3	31.3	8.7	9.5	Do.
Do.	163811	...do....	197	65	26	43	30.8	16.2	6.2	9.5	29.6	8.4	8.7	Basal suture closed..
Do.	163812	...do....	206	54	27	46	31.5	16.3	6.3	9.7	30.4	8.3	9.2	Do.
Do.	163849	...do....	201	57	30	44	31.9	17.0	6.8	9.3	29.5	8.6	9.8	Do
Do.	163780	Female.	186	64	26	40	....	13.4	5.0	9.3	28.0	8.2	9.0	Do.
Do.	163781	...do....	195	70	27	44	31.1	17.9	6.2	9.7	28.9	8.3	8.5	Basal suture obliterated.
Do.	163782	...do....	184	64	27	41	30.2	15.9	6.5	9.3	29.1	8.5	9.8	Basal suture closed.
Do.	163787	...do....	188	64	27	45	32.0	17.1	5.6	9.4	30.7	8.5	9.4	Do.
Do.	163792	...do....	190	60	28	41	28.9	15.7	5.5	9.3	27.6	8.7	9.1	Do.
Do.	163803	...do....	....	....	28	....	29.6	15.7	5.6	9.4	28.8	9.1	9.0	Basal suture open.
Do.	163809	...do....	188	51	27	41	29.2	15.9	5.8	9.4	28.5	8.3	8.8	Basal suture closed.
Do.	163813	...do....	195	59	29	42	28.9	15.4	5.8	9.4	28.6	9.2	9.7	Do.
Do.	163851	...do....	181	55	27	39	27.5	13.8	4.5	8.6	27.0	7.9	8.2	Do.
G. E. A.: *T. dæmon.*														
Marangu	34726	Male....	....	....	....	44	29.7	15.0	5.8	10.3	29.6	9.0	10.1	Basal suture open.
Do.	34728	Female.	....	....	....	45	32.3	15.8	5.9	9.8	31.7	9.4	10.2	Basal suture obliterated.
Do.	34729	...do....	....	....	....	....	32.0	15.8	5.4	9.5	31.2	9.4	11.8	Do.
Mount Kilmanjaro	37364	...do....	....	....	....	43	30.4	14.7	6.0	10.2	29.5	8.8	10.4	Basal suture open.
Uganda: *T. ankoliæ.*														
Burumba	140767	Male....	198	68	28	....	....	16.3	5.6	10.2	30.7	8.8	9.6	Teeth moderately worn.
Do.	140768	...do....	200	....	28	42	28.8	17.2	5.6	9.6	29.8	7.4	8.3	Basal suture closed.

TACHYORYCTES ANKOLIÆ Thomas.

1909. *Tachyoryctes ankoliæ* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 545. December. (Burumba, Ankole, southern Uganda; type in British Museum.)

Specimens.—Two, as follows:

UGANDA: Burumba, Ankole (Doggett).

Family MURIDÆ.

Genus DENDROMUS Smith.

1829. *Dendromus* SMITH, Zool. Journ., vol. 4, p. 438. (*D. mesomelas.*)

1832. *Dendromys* SMUTS, Diss. Zool., Mamm. Cap., p. 39.

1916. *Poemys* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 18, p. 238. August. (*D. melanotis.*) [Valid as a subgenus.]

Of the 10 species and subspecies of tree mice of this genus listed below, all belong to the typical subgenus *Dendromus* as restricted by Thomas except the black-fronted forms, *nigrifrons* and *spectabilis*. These last two are members of the subgenus *Poemys*, characterized by the presence of a nail, instead of a claw, on the fifth hind toe.

For measurements of specimens of *Dendromus* see table, pages 51–53.

DENDROMUS INSIGNIS INSIGNIS Thomas.

1903. *Dendromys insignis* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 12, p. 341. September. (Nandi, British East Africa; type in British Museum.)

1910. *Dendromys insignis* ROOSEVELT, African Game Trails, Amer. ed., pp. 472, 477; London ed., pp. 484, 489. (Part.)

Specimens.—Sixty-one, from localities as follows:

BRITISH EAST AFRICA: Aberdare Mountains, east base and west base, 2 (Heller); Engare Narok River, 1 (Loring); Kaimosi, 50, including 23 in alcohol (Heller); Lake Naivasha, 1 (Loring); Lukosa River, 1 in alcohol (Heller); Naivasha Station, 1 (Loring); Nyeri, 1 (Loring); Ravine Boma, 3, including 2 in alcohol, (Heller); Wambugu, 1 (Loring).

Specimens of *Dendromus insignis* from Naivasha, the Aberdare Mountains, Nyeri, and Wambugu differ from typical specimens from the direct Nyanza drainage in their duller color, thus approaching in that respect skins of *D. i. percivali.* They retain, however, the narrow braincase of true *insignis* and seem best placed with that form. The series from Kaimosi, which is not far from the type locality, shows that the form averages quite bright and reddish in color, although there is considerable individual variation in this respect. The younger examples are much less reddish than skins of old adults.

> Although belonging to the genus of tree mice, this large *Dendromys* lives on the ground, seemingly builds no nest, and is most often found in the runways of the *Otomys*. (African Game Trails, p. 477.)

DENDROMUS INSIGNIS PERCIVALI Heller.

Plate 16.

1912. *Dendromus mesomelas percivali* Heller, Smithsonian Misc. Coll., vol. 59, No. 16, p. 5. July 5. (Mount Gargues, Mathews Range, British East Africa; type in U. S. Nat. Mus.)

1914. *Dendromus* sp. Cockerell, Miller, and Printz, Zool. Anz., vol. 44, p. 439. June 23.

Specimens.—Eighty-eight, from the following localities:

British East Africa: Mount Gargues, 3 (Percival); Mount Kenia, west side, 77, including 12 in alcohol (Loring, Mearns); West Kenia Forest Station, 8 (Loring).

This subspecies of the larger striped *Dendromus* is abundant on the Northern Guaso Nyiro drainage of Mount Kenia. I can find no reason for separating the Kenia specimens from the small series of skins and skulls collected in the Mathews Range. They differ from typical *insignis* in the darker, less reddish coloration, longer fur, larger ears, and in the slightly larger braincase. The difference in color of the Kenia form was noted by Doctor Lönnberg in 1912.[1]

Young female skins from Mount Gargues have somewhat blacker ears than any specimen from Kenia, but the ears of adult skins from the two localities are alike in color and I believe the difference shown by the young to be a matter of pelage. Much better series from Mount Gargues are needed.

The specimens from Gargues were collected at altitudes from 6,500 to 7,100 feet. On Kenia, Loring and Mearns trapped this species at numerous collecting stations ranging in altitude from 7,500 feet up to 14,200 feet.

DENDROMUS WHYTEI PALLESCENS Osgood.

1910. *Dendromus whytei pallescens* Osgood, Field Mus. Nat. Hist., Zool. ser., vol. 10, No. 2, p. 7. February. (Ulukenia Hills, British East Africa; type in Field Mus. Nat. Hist., Chicago.)

1910. *Dendromus whytei pallescens* Roosevelt, African Game Trails, Amer. ed., p. 472; London ed., p. 484.

Specimens.—Three, from the following localities:

British East Africa: Fort Hall, 2, including 1 odd skull (Loring); West Kenia Forest Station, 1 in alcohol (Loring).

DENDROMUS WHYTEI CAPITIS Heller.

Plate 16.

1912. *Dendromus whytei capitis* Heller, Smithsonian Misc. Coll., vol. 59, No. 16, p. 6, July 5. (Mount Lololokwi, British East Africa; type in U. S. Nat. Mus.)

Specimen.—One, as follows:

British East Africa: Mount Lololokwi, 6,000 feet altitude, the type (Heller).

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[1] Kungl. Svenska Vet. Akad., vol. 48, No: 5, pp. 90, 91. 1912.

DENDROMUS RUDDI Wroughton.

1910. *Dendromus ruddi* Wroughton, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 275. March. (Malikisi, Mount Elgon, British East Africa; type in British Museum.)

Specimens.—Thirty-four, from the following localities:

Lado: Rhino Camp, 1 (Loring).

Uganda: Gondokoro, 1 (Loring); Kajuia, 1 (Loring).

British East Africa: Kaimosi, 31 (Heller, Turner).

The specimen from Rhino Camp is duller in color and has slightly shorter pelage than skins from Kaimosi, but is otherwise indistinguishable from them. The single specimen from Gondokoro is immature, but is like young of same age in the Kaimosi series. The Kajuia (near Hoima) specimen is typical *ruddi*. These three specimens were included by Heller with his *Dendromus lineatus*[1] and account in a great measure for the great variation in the distinctness of the black median dorsal stripe which he attributes to that form.

DENDROMUS OCHROPUS Osgood.

1910. *Dendromus ochropus* Osgood, Field Mus. Nat. Hist., Zool. ser., vol. 10, No. 2, p. 6. February. (Lake Elmenteita, British East Africa; type in Field Mus. Nat. Hist., Chicago.)

Specimens.—Six, as follows:

British East Africa: Naivasha Station (Loring).

Loring notes five embryos in a female captured on July 30 at Naivasha.

A species related to *Dendromus ochropus* has been described from Nairobi by Osgood as *Dendromus nairobæ.*[2] It is not represented in our collection.

DENDROMUS ACRÆUS Wroughton.

1909. *Dendromus acræus* Wroughton, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 541. December. (Kirui, Elgon, British East Africa; type in British Museum.)

Specimens.—Sixty-one, from the following localities:

British East Africa: Aberdare Mountains, west slope at 9,100 feet, 1 in alcohol (Heller); Kaimosi, 58, including 38 in alcohol (Heller); Sirgoit Lake, 2, including 1 in alcohol (Heller)

A female collected at Kaimosi, January 27, contained three embryos.

DENDROMUS LINEATUS Heller.

Plate 16.

1911. *Dendromus lineatus* Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 4. February 28. (Rhino Camp, Lado; type in U. S. Nat. Mus.)

Specimens.—Nineteen, including 6 in alcohol, as follows:

Lado: Rhino Camp (Loring).

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[1] Smithsonian Misc. Coll., vol. 56, No. 17, pp. 4, 5. Feb. 28, 1911.

[2] Field Mus., Zool. ser., vol. 10, No. 2, p. 7. February, 1910.

Measurements of specimens of Dendromus.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Skull: Condylobasal length.	Zygomatic breadth.	Breadth of brain-case.	Length of nasals.	Inter-orbital breadth.	Length of palatine slits.	Upper tooth row.	Observations.
D. i. insignis.												
B. E. A.:												
Kaimosi	184074	Male	85	110	22.5	12.3	11.0	9.0	3.3	5.5	3.8	Teeth moderately worn.
Do	184075	...do	83	101	22.1	11.7	11.5	9.1	3.3	5.2	3.7	Do.
Do	184084	...do	85	108	22.2	11.6	10.8	8.8	3.3	5.1	3.8	Do.
Do	184085	...do	86	104	21.6	11.6	10.7	8.9	3.2	5.0	3.8	Do.
Do	184090	...do	90	103	22.6	12.0	11.0	9.7	3.2	5.2	3.8	Do.
Do	184091	...do	80	105	21.4	11.1	10.9	8.9	3.3	4.9	3.8	Teeth little worn.
Do	184080	Female	80	97	21.3	11.6	10.8	8.8	3.2	5.0	3.7	Teeth moderately worn.
Do	184082	...do	80	96	21.3	11.5	10.7	8.7	3.3	4.8	3.6	Do.
Do	184089	...do	82	98	21.5	11.6	10.8	9.1	3.1	4.8	3.5	Teeth considerably worn.
Ravine Boma	165311	Male	100	117	22.0	11.8	10.8	9.8	3.4	5.2	3.9	Teeth moderately worn.
Nyeri	164421	...do	97	110	22.4	11.2	10.9	9.3	3.4	5.4	....	Do.
Aberdare Mountains	184067	...do	85	106	22.3	11.8	10.8	9.7	3.3	5.6	4.0	Do.
D. i. percivali.												
B. E. A.:												
Mount Gargues	[1] 181791	Female	86	105	22.2	11.7	10.9	8.9	3.3	5.3	3.9	Teeth much worn.
Do	184095	...do	73	90	20.3	11.9	10.9	8.0	3.5	5.2	3.8	Teeth little worn.
Mount Kenia	164429	Male	91	96	21.6	11.8	11.5	8.9	3.2	5.3	3.8	Teeth moderately worn.
Do	164431	...do	88	102	22.1	12.4	11.6	9.7	3.4	5.1	4.0	Do.
Do	164439	...do	88	104	21.8	11.8	11.0	9.3	3.5	5.1	3.9	Do.
Do	164440	...do	89	109	22.2	11.5	11.0	9.5	3.3	5.6	4.0	Do.
Do	164382	Female	81	113	21.2	11.8	11.3	8.8	3.4	4.9	3.9	Do.
Do	164390	...do	84	85	21.8	11.8	11.3	8.8	3.5	4.9	3.9	Do.
Do	164392	...do	80	97	21.2	11.4	11.8	9.0	3.3	4.6	4.1	Do.
Do	164408	...do	91	102	21.9	11.8	11.1	9.8	3.5	4.8	3.8	Do.
Do	164438	...do	79	91	20.9	11.5	11.3	8.8	3.4	4.4	4.0	Do.
Do	164448	...do	87	101	20.9	11.8	11.5	9.4	3.2	5.0	3.7	Do.

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[1] Type.

Measurements of specimens of Dendromus—Continued.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Skull: Condylobasal length.	Zygomatic breadth.	Breadth of braincase.	Length of nasals.	Interorbital breadth.	Length of palatine slits.	Upper tooth row.	Observations.
D. w. pallescens.												
B. E. A.:												
Fort Hall	165315	Female	....	....	15.9	9.5	8.9	6.8	2.7	3.3	3.1	Teeth moderately worn.
Do	164412	...do	65	76	....	9.2	8.8	7.1	2.7	3.6	3.0	Do.
D. w. capitis.												
B. E. A.: Mount Lololokwi	[1] 181792	...do	60	88	17.7	10.3	9.4	7.1	3.2	3.8	3.3	Do.
D. ruddi.												
B. E. A.:												
Kaimosi	184102	Male	70	100	18.9	10.6	9.8	7.3	3.3	4.1	3.3	Teeth much worn.
Do	184111	...do	70	95	18.8	10.7	9.8	7.6	3.3	3.8	3.2	Teeth moderately worn.
Do	184112	...do	69	99	18.3	10.4	9.6	7.2	3.3	3.4	3.3	Do.
Do	184101	Female	68	92	18.3	10.3	9.6	7.2	3.3	3.8	3.3	Teeth much worn.
Do	184104	...do	60	90	17.3	10.3	9.7	6.7	3.3	3.8	3.2	Teeth little worn.
Do	184108	...do	65	79	17.4	9.7	8.8	7.0	2.6	4.1	3.0	Teeth moderately worn.
Do	184109	...do	67	96	18.2	10.5	9.8	6.9	3.2	3.8	....	Do.
Do	184113	...do	66	91	18.0	10.4	9.4	7.0	2.7	3.9	3.2	Do.
Uganda: Kajuia	165271	...do	73	....	17.9	10.1	9.2	7.4	2.6	3.6	3.0	Do.
D. ochropus.												
B. E. A.:												
Naivasha	162360	Male	75	83	....	10.8	....	8.6	2.9	4.5	3.3	Do.
Do	162361	...do	75	82	....	10.8	....	7.5	2.9	4.3	3.3	Do.
Do	162358	Female	67	89	18.1	10.2	9.5	6.8	2.9	3.9	3.3	Do.
Do	162359	...do	63	79	....	9.8	....	7.3	2.7	3.9	3.3	Teeth little worn.
Do	162363	...do	61	78	....	....	....	6.8	2.9	3.7	3.1	Do.
D. acræus.												
B. E. A.:												
Sirgoit	164377	Male	65	72	17.6	10.1	9.4	6.5	2.7	3.7	3.0	Teeth moderately worn.
Kaimosi	184054	...do	62	77	17.3	10.1	9.1	7.3	2.7	3.9	3.3	Do.
Do	184062	...do	65	85	17.7	9.9	9.3	7.8	2.8	3.8	3.1	Do.

Do	184064	...do.....	65	82	17.8	9.9	9.0	7.3	2.5	3.8	3.0	Teeth much worn.
Do	184065	...do.....	70	85	19.2	10.7	9.5	8.0	2.7	4.3	3.1	Do.
Do	184066	...do.....	67	85	18.2	10.2	9.3	7.8	2.7	3.6	3.2	Teeth considerably worn.
Do	184055	Female..	60	73	16.9	9.5	8.6	6.5	2.7	4.0	2.9	Do.
Do	184056	...do.....	59	73	16.7	9.3	8.8	6.8	2.6	3.8	2.9	Teeth moderately worn.
Do	184057	...do.....	60	75	17.3	10.1	9.2	7.2	2.7	3.8	3.1	Teeth considerably worn.
Do	184059	...do.....	58	75	16.7	9.7	9.4	6.8	2.8	3.8	2.9	Teeth moderately worn.
Do	184061	...do.....	65	85	18.4	10.0	9.3	7.1	2.8	3.8	3.1	Teeth much worn.
Do	184063	...do.....	65	84	17.8	9.7	8.9	7.0	2.6	3.9	2.9	Teeth moderately worn.
D. lineatus.												
Lado:												
Rhino Camp	[1] 164816	Male....	65	87	17.8	9.7	8.5	7.2	2.6	3.7	3.0	Do.
Do	165262	...do.....	57	76	16.5	9.4	....	6.3	2.8	3.8	2.9	Teeth little worn.
Do	165258	Female..	60	76	17.2	9.5	8.8	6.8	2.6	3.7	2.8	Teeth moderately worn.
Do	165260	...do.....	63	81	17.3	10.2	....	6.8	3.1	3.7	2.9	Do.
Do	165261	...do.....	56	76	16.2	9.2	8.8	6.4	2.7	3.3	2.8	Teeth little worn.
Do	165263	...do.....	70	78	17.1	9.3	8.5	6.8	2.6	3.6	2.8	Teeth moderately worn.
Do	165264	...do.....	65	76	16.6	9.3	....	6.3	2.8	3.7	2.8	Do.
Do	165265	...do.....	55	71	15.9	9.0	8.4	5.9	2.7	3.5	2.8	Do.
D. n. nigrifrons.												
G. E. A.:												
Mount Kilimanjaro	37367	Male....	....	....	....	....	9.3	7.4	2.6	4.2	2.8	Do.
Do	[1] 35263	Female..	....	....	17.8	9.8	9.3	7.4	2.4	4.3	2.9	Do.
B. E. A.: Kijabe	162354	...do.....	71	73	....	9.8	....	7.7	2.7	4.4	3.3	Teeth considerably worn.
D. n. spectabilis.												
Lado:												
Rhino Camp	[1] 164815	...do.....	68	78	19.0	10.3	9.2	8.7	2.7	4.2	3.2	Teeth moderately worn.
Do	165278	...do.....	62	78	18.2	9.7	8.9	7.8	2.6	3.8	3.3	Do.
Do	165279	...do.....	57	72	17.4	9.5	8.9	8.8	2.8	3.9	3.0	Do.
Do	165280	...do.....	59	71	17.4	9.4	9.1	7.3	2.6	4.0	3.1	Do.
Uganda: Butiaba	165274	Male....	63	75	17.9	9.9	8.9	7.5	2.6	4.1	3.1	Do.

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[1] Type.

The specimens recorded from Gondokoro and Hoima [1] by Heller at the time of the description of this species have now been referred to *Dendromus ruddi* Wroughton. One of the Rhino Camp specimens proves to belong with the same species. This removes from the series all the specimens with the dorsal stripe obsolete, but there is still considerable variation in the distinctness of this stripe in *lineatus* although most of the adult specimens have it well pronounced.

The three forms of this little group of tree mice, *ochropus*, *acræus*, and *lineatus*, are closely related and are probably intergrading subspecies. The most southern of the three, *ochropus*, is the largest, with largest skull and teeth; *acræus* is medium sized and intermediate in color of the underparts as well as in distribution; *lineatus* is the smallest. For detailed measurements of specimens see page 53.

DENDROMUS NIGRIFRONS NIGRIFRONS True.

Plate 17.

1892. *Dendromys nigrifrons* TRUE, Proc. U. S. Nat. Mus., vol. 15, p. 462. October 26. (Mount Kilimanjaro, German East Africa; type in U. S. Nat. Mus.)

1909. *Dendromys nigrifrons* LYON AND OSGOOD, Bull. 62, U. S. Nat. Mus., p. 158. January 28.

1910. ?*Dendromys nigrofrons* ROOSEVELT, African Game Trails, Amer. ed., p. 477; London ed., pp. 488, 489.

Specimens.—Six, from localities as follows:

BRITISH EAST AFRICA: Kijabe, 1 (Loring).

GERMAN EAST AFRICA: Mount Kilimanjaro, 5, including 2 in alcohol (Abbott).

The three skins from Kilimanjaro were collected at 5,000 feet. The type is in alcohol, with skull removed. It is uncertain to which form of *Dendromus* the interesting notes published by Colonel Roosevelt at the above reference pertain, as no specimens of the genus were preserved by members of the expedition from Athi Plains or from the Sotik, the two localities mentioned.

DENDROMUS NIGRIFRONS SPECTABILIS Heller.

Plate 17.

1911. *Dendromus spectabilis* HELLER, Smithsonian Misc. Coll., vol. 56, No. 17, p. 3. February 28. (Rhino Camp, Lado Enclave; type in U. S. Nat. Mus.)

Specimens.—Fourteen, from the following localities:

LADO: Rhino Camp, 13, including 4 in alcohol (Loring, Mearns).

UGANDA: Butiaba, 1 (Heller).

This form is very much like typical *nigrifrons*, but has the underparts less buffy. I can see no difference in the color of the feet in the two forms.

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[1] The specimen is labeled "Kajuia."

Genus STEATOMYS Peters.

1846. *Steatomys* PETERS, Ber. Königl. Preuss. Akad. Wiss., Berlin, p. 258. (*S. pratensis*.)

The fat mouse is rare in British East Africa if one can judge its abundance from the number of specimens which have been recorded in print. The Smithsonian African Expedition procured the only specimens in our collection, and these are few in number.

STEATOMYS ATHI Heller.

Plate 17.

1910. *Steatomys athi* HELLER, Smithsonian Misc. Coll., vol. 54 (No. 1924), p. 3. February 28. (Ulukenia Hills, Athi Plains, British East Africa; type in U. S. Nat. Mus.)

1910. *Steatomys athi* ROOSEVELT, African Game Trails, Amer. ed., p. 472; London ed., p. 484.

Specimens.—Four, including one in alcohol, as follows:

BRITISH EAST AFRICA: Ulukenia Hills (Loring).

Genus ZELOTOMYS Osgood.

1910. *Zelotomys* OSGOOD, Field Mus. Pub. Zool., vol. 10, No. 2, p. 7. February. (*Z. hildegardeæ*.)

The two subspecies of this "broad-headed" mouse listed below are closely related, and their distinctness can not be considered as certain until more material is studied. In the original diagnosis of the genus, Mr. Osgood erroneously stated that the molars are more hypsodont than in "*Mus*" (=*Rattus*); as a matter of fact they are even lower crowned. Mr. Thomas has already corrected the mammary formula to 3–2=10.[1]

For measurements of specimens see page 56.

ZELOTOMYS HILDEGARDEÆ HILDEGARDEÆ (Thomas).

1902. *Mus hildegardeæ* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 9, p. 219. March. (Machakos, British East Africa; type in British Museum.)

1910. *Zelotomys hildegardeæ* OSGOOD, Field Mus. Pub. Zool., vol. 10, No. 2, p. 7. February.

1910. *Zelotomys hildegardæ* ROOSEVELT, African Game Trails, Amer. ed., pp. 473, 478; London ed., pp. 485, 489.

Specimens.—Two, as follows:

BRITISH EAST AFRICA: Juja Farm, 1 (Loring); Kapiti Plains, 1 (Loring).

ZELOTOMYS HILDEGARDEÆ VINACEUS Heller.

Plate 18.

1912. *Zelotomys hildegardæ* (sic) *vinaceus* HELLER, Smithsonian Misc. Coll., vol. 59, No. 16, p. 10. July 5. (Ndi, Mount Mbololo, Taita Hills, British East Africa; type in U. S. Nat. Mus.)

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 16, p. 481. December, 1915.

Measurements of specimens of Zelotomys from British East Africa.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry, without claws.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Length nasals.	Length mandible.	Upper tooth row.	Condition of molar teeth.
Z. h. hildegardeæ.												
Kapiti Plains	161803	Male	119	98	22.3	29.4	17.1	13.4	11.2	19.5	5.5	Moderately worn.
Juja Farm	161804	Female	135	115	22.6	29.6	15.9	12.8	11.9	19.6	5.6	Do.
Z. h. vinaceus.												
Mount Sagalla	183913	...do...	127	106	23.2	31.3	16.9	13.2	11.8	20.5	5.6	Do.
Mount Umengo	183912	Male	115	94	22.0	28.4	15.0	11.9	11.1	18.6	5.5	Do.
Ndi	[1] 181798	Female	117	98	22.1	29.2	16.0	12.7	11.7	19.1	5.5	Do.
Do	183911	...do...	115	92	20.9	27.5	15.2	12.4	11.0	18.2	5.3	Do.

[1] Type.

Specimens.—Four, from localities as follows:

British East Africa: Mount Sagalla, 1 (Heller); Mount Umengo, 1 (Heller); Ndi, 2 (Heller).

The female collected on Mount Sagalla, November 19, contained seven large embryos. Several statements in the original account of this form need correction. The skins are distinctly darker, not lighter, in dorsal coloration than skins of true *hildegardeæ;* the under parts are not more "whitish;" the mesopterygoid fossa is distinctly wider, not narrower, in three out of four of the skulls, than in our two skulls of *hildegardeæ;* the tail is hardly "quite hairless," but is well clothed with light colored hairs longer than the width of two scale rows. The three paratypes do not agree closely with the type in color or skull characters. There is such an extraordinary amount of individual variation among the specimens that I have rather doubted their conspecific identity. This is especially true of the skulls, where the variation in size, breadth of rostrum, and other minor characters is unusual. It would be interesting to study a large series of these mammals from some one locality.

Genus THAMNOMYS Thomas.

1907. *Thamnomys* Thomas, Ann and Mag. Nat. Hist., ser. 7, vol. 19, p. 121. January. (*T. venustus.*)

1915. *Grammomys* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 16, p. 150. August. (*T. dolichurus.*)

All the forms of *Thamnomys* included in our East African collections belong to that section of the genus which has been named *Grammomys* by Thomas. The characters on which the genus *Grammomys* is based[1] seem altogether too slight for even subgeneric recognition.

For measurements of specimens of *Thamnomys* see pages 59–61.

THAMNOMYS SURDASTER SURDASTER Thomas and Wroughton.

1892. *Mus arborarius* True, Proc. U. S. Nat. Mus., vol. 15, p. 459. (Not of Peters.)[2]

1908. *Thamnomys surdaster* Thomas and Wroughton, Proc. Zool. Soc. London, 1908, p. 550. (Zomba, British Central Africa; type in British Museum.)

Specimens.—Three, as follows:

German East Africa: Mount Kilimanjaro (Abbott).

No specimens of typical *surdaster* are in the National Museum collection, but Mr. Thomas has referred the Kilimanjaro form to this species[3] and remarks that it agrees in color with examples from Nyasa.

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[1] "Like *Thamnomys*, but with the postero-internal or '*x*' cusp of the first and second molars reduced to a mere connecting ridge running from the inner cusp of the median lamina to the hinder point of the tooth."—Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 16, p. 150. August, 1915.

[2] Regarding the identification of *Mus arborarius* Peters, see Thomas and Wroughton, Proc. Zool. Soc. London, 1908, p. 548.

[3] Ann. and Mag. Nat. Hist., ser. 8, vol. 16, p. 314. September, 1910.

THAMNOMYS SURDASTER POLIONOPS Osgood.

1910. *Thamnomys surdaster polionops* Osgood, Field Mus. Nat. Hist., Pub. Zool., vol. 10, No. 2, p. 8. February. (Ulukenia Hills, British East Africa; type in Field Mus. Nat. Hist., Chicgao.)

1910. *Thamnomys surdaster polionops* Roosevelt, African Game Trails, Amer. ed., pp. 473, 478; London ed., pp. 485, 489.

Specimens.—Seventy-two, from localities as follows:

British East Africa: Engare Narok River, 4 (Loring); Kamiti Farm, Athi Plains, 2 (Loring); Kapiti Plains, 3 (Loring); Kitanga, 2 (Mearns); Mount Mbololo, 48, including 21 in alcohol (Heller); Mount Umengo, 8 (Heller); Oljoro O Nyon River, 2 (Loring, Heller); Oni, 1 (Loring); Wambugu, 2 (Loring).

Specimens from the Taita Hills (Umengo and Mbololo) appear to be somewhat intermediate between typical *polionops* and the Kilimanjaro form which has been referred to *surdaster*, but they are clearly nearest to *polionops* and are best placed with that subspecies. The cheeks and sides are considerably less richly colored than in the Kilimanjaro specimens. Specimens from the Mau Escarpment (heads of Oljoro O Nyon and Engare Narok Rivers) are inseparable from examples of typical *polionops*. The Athi Plains skins have longer tails than usual, but are otherwise typical.

Heller found three embryos each in females collected at Mount Mbololo, November 5; and Mount Umengo, November 13. Half-grown young were taken at the same dates. Loring caught specimens of this commonly arboreal rat "in grass and under rocks in center of prairie land three miles from water." Heller notes trapping it both in trees and on the ground.

THAMNOMYS SURDASTER LITTORALIS Heller.

Plate 18.

1912. *Thamnomys dolichurus littoralis* Heller, Smithsonian Misc. Coll., vol. 59, No. 16, p. 10. July 5. (Mazeras, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Two, as follows:

British East Africa: Mazeras (Heller).

This race differs conspicuously from *T. s. polionops* by its almost pure white feet.

THAMNOMYS IBEANUS IBEANUS Osgood.

1910. *Thamnomys ibeanus* Osgood, Field Mus. Zool. ser., vol. 10, No. 2, p. 8. February. (Molo, British East Africa; type in Field Mus. Nat. Hist., Chicago.)

1914. *Thamnomys* sp. Cockerell, Miller, and Printz, Zool. Anz., vol. 44, p. 439; fig. 10, p. 440. June.

Specimens.—Twenty, from localities as follows:

British East Africa: Aberdare Mountains, 1 (Heller); Burgunett River, Meru Road, 1 (Heller); Kabalolot Hill, 4 (Heller); Naivasha, 13 (Loring); Sirgoit Lake, 1 in alcohol (Heller).

Measurements of specimens of Thamnomys.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Mastoid breadth.	Length of nasals.	Length of mandible.	Upper tooth row.	Condition of molar teeth.
T. s. surdaster.												
G. E. A.:												
Mount Kilimanjaro	37370	Male	....	....	25.3	13.1	4.1	....	12.0	15.0	4.5	Moderately worn.
Do	35243	Female	....	....	26.9	14.7	4.4	12.3	11.4	16.6	4.5	Considerably worn.
Do	37371	...do...	....	....	....	14.5	4.3	....	10.5	16.6	4.6	Do.
T. s. polionops.												
B. E. A:												
Mount Umengo	183803	Ma'e	110	163	26.9	14.4	4.2	12.3	11.8	16.2	4.6	Much worn.
Do	183807	...do...	115	173	26.3	13.7	4.0	12.1	10.3	16.3	4.6	Moderately worn.
Do	183736	Female.	115	162	27.0	14.0	4.4	12.0	11.2	16.0	4.8	Do
Do	183805	...do...	112	168	27.4	14.4	4.0	12.1	11.6	15.9	4.7	Do
Do	183808	...do...	113	172	26.5	13.7	3.9	11.8	10.9	16.9	4.8	Do.
Mount Mbololo	183777	Ma'e	120	....	27.3	14.9	4.1	12.2	11.1	16.4	4.5	Much worn.
Do	183778	...Do...	103	167	25.9	13.2	3.8	11.8	10.5	16.0	4.6	Moderately worn.
Do	183780	...do...	110	145	25.8	13.8	4.3	11.8	10.4	15.2	4.5	Do.
Do	183783	...do...	105	166	26.0	13.7	4.2	11.8	10.5	15.5	4.6	Do.
Do	183791	...do...	110	169	26.3	13.8	4.0	12.1	10.9	16.1	4.7	Do.
Do	183794	...do...	118	165	28.0	15.0	4.4	12.5	12.2	16.7	4.5	Much worn.
Do	183797	..do...	115	168	28.0	14.8	4.5	12.5	10.8	17.1	4.4	Do.
Do	183798	...do...	110	161	26.6	13.8	4.1	12.1	10.6	15.5	4.5	Moderately worn.
Do	183801	...do...	112	178	28.5	14.8	4.5	12.4	12.3	16.9	4.5	Much worn.
Do	183784	Female.	110	162	25.9	13.8	4.0	12.0	11.5	15.3	4.8	Moderately worn.
Ulukenia Hills	[1] 17112	Male	120	164	27.2	14.6	4.5	12.7	11.0	16.3	4.5	Do.
Wambugu	163428	Female.	117	160	25.9	13.5	4.6	11.9	9.4	15.6	4.2	Do.
Oni	163426	...do...	105	174	24.7	13.3	4.3	11.9	9.7	15.4	4.6	Do.
Kamiti Farm	163427	...do...	113	191	26.8	14.4	4.4	12.4	11.0	16.5	4.3	Do.
Kitanga Farm	161855	Ma'e	108	150	23.8	12.8	4.2	11.9	10.7	14.5	4.3	Do.
Kapiti Plains	161814	...do...	105	171	25.3	13.7	4.4	11.9	10.3	15.4	4.3	Do.
Do	161830	...do...	109	158	....	13.8	4.3	....	9.7	15.2	4.2	Do.

[1] Type; Field Mus. Nat. Hist., Chicago.

Measurements of specimens of Thamnomys—Continued.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Mastoid breadth.	Length of nasals.	Length of mandible.	Upper tooth row.	Condition of molar teeth.
T. s. polionops—Continued.												
B. E. A.—Continued.												
Engare Narok	162514	Male	115	163	27.3	14.4	4.4	12.2	11.8	16.8	4.3	Moderately worn.
Do	162516	...do	107	174	26.0	14.1	4.4	10.8	10.9	16.2	4.5	Do.
Do	162515	Female.	108	178	23.9	14.2	4.3	12.4	10.8	16.5	4.6	Do
Oljoro O Nyon	162510	Male	125	180	26.6	14.5	4.4	12.4	11.3	16.5	4.5	Do.
Do	162513	...do	112	185	....	13.6	4.5	11.9	10.5	16.3	4.4	Do.
Do	162511	Femal	111	175	26.4	14.4	4.4	12.4	11.2	16.2	4.5	Do.
T. s. littoralis.												
Mazeras	[1] 181799	Male	120	160	28.1	14.9	4.9	12.5	10.6	17.0	4.5	Considerably worn.
Do	183923	Female.	109	174	25.9	14.1	4.2	12.1	9.4	15.9	4.4	Moderately worn.
T. i. ibeanus.												
Molo	[2] 17096	Male	136	193	30.2	15.8	5.0	13.4	11.8	17.3	5.2	Considerably worn.
Naivasha	162518	...do	111	185	28.1	14.1	4.3	12.3	11.0	16.1	4.7	Moderately worn.
Do	162520	...do	....	....	28.6	14.8	4.4	12.7	12.0	17.3	4.9	Do.
Do	162521	...do	120	182	27.8	14.6	4.4	12.6	11.2	16.6	4.8	Do.
Do	162530	...do	121	189	29.6	15.6	4.5	13.0	11.8	18.1	5.0	Do.
Do	162517	Female.	109	175	27.3	14.5	4.5	12.3	11.2	16.6	4.8	Do.
Do	162528	...do	119	187	27.8	14.6	4.6	12.6	11.8	16.8	4.5	Much worn.
Do	162529	...do	115	186	26.0	14.5	4.4	11.7	10.9	16.2	4.5	Moderately worn.
Meru Road	183753	...do	128	185	29.0	15.3	4.8	12.8	11.2	17.7	5.0	Considerably worn.
Aberdare Mountains	183754	Male	124	190	29.0	15.2	4.4	13.0	12.2	17.3	5.0	Do.
T. i. lutosus.												
Mount Gargues	183758	...do	120	173	28.5	14.6	4.6	12.7	11.8	16.9	4.8	Moderately worn.
Do	183761	...do	118	180	27.3	14.6	4.7	12.4	11.2	16.1	5.2	Do.
Do	183762	...do	120	207	29.4	14.8	4.8	12.8	11.3	17.7	4.9	Considerably worn.
Do	183763	...do	115	169	27.2	14.5	4.4	12.4	11.7	16.4	4.7	Moderately worn.
Do	183764	...do	115	175	27.6	14.3	4.4	12.3	11.4	16.5	4.6	Do.
Do	183765	...do	115	170	28.6	14.8	4.8	12.6	12.3	17.0	4.7	Do.

Do	183757	Female.	120	173	28.0	14.7	4.3	12.3	11.7	17.1	4.8	Do.
Do	183759	...do....	112	176	28.0	14.6	4.7	12.4	11.6	17.1	4.6	Considerably worn.
Do	183767	...do....	105	164	26.9	14.2	4.5	12.2	11.0	16.1	4.6	Moderately worn.
Do	183770	...do....	120	195	28.8	14.4	4.6	12.3	12.2	16.8	4.8	Do.
Do	183771	...do....	122	187	28.9	15.0	4.6	12.7	12.3	17.8	4.7	Considerably worn.
Engare Ndare River	183756	Male....	118	172	27.4	14.4	4.5	12.2	10.9	16.4	4.8	Moderately worn.
Do	183755	Female.	115	175	27.2	14.2	4.3	12.1	10.3	16.4	4.9	Do.
Do	183773	...do....	120	187	27.8	15.1	4.5	12.8	11.8	16.8	4.9	Do.
Do	183774	...do....	125	197	28.7	15.5	4.7	13.1	12.2	17.9	4.9	Much worn.
T. discolor.												
Kaimosi	183709	Male....	110	161	25.8	14.0	4.5	12.1	10.7	15.1	4.3	Moderately worn.
Do	183718	...do....	110	167	25.9	13.7	4.6	11.8	10.4	15.8	4.4	Do.
Do	183726	...do....	108	175	26.8	13.8	4.6	12.5	10.9	16.3	4.3	Do.
Do	183731	...do....	110	155	25.9	13.9	4.4	11.6	10.6	15.8	4.1	Do.
Do	183733	...do....	118	168	26.8	14.0	4.5	12.0	11.2	15.9	4.3	Do.
Do	183734	...do....	113	174	26.2	13.8	4.3	12.0	11.0	15.4	4.4	Do.
Do	183750	...do....	120	183	27.4	14.0	4.6	12.1	11.1	16.4	4.0	Considerably worn.
Do	183708	Female.	115	180	26.8	13.9	4.4	12.0	10.7	15.9	4.4	Moderately worn.
Do	183710	...do....	105	168	25.2	13.8	4.1	11.5	9.6	15.8	4.3	Do.
Do	183723	...do....	120	175	27.2	14.6	4.4	12.7	11.1	16.6	4.1	Much worn.
Do	183732	...do....	115	164	26.1	14.2	4.3	11.9	10.8	16.0	4.2	Moderately worn.
Do	183752	...do....	110	171	25.4	13.4	4.3	11.8	9.7	14.9	4.3	Do.
T. m. gazellæ.												
Lado:												
Rhino Camp	165227	Male....	95	154	23.1	12.3	4.4	11.2	9.0	14.1	4.1	Do.
Do	165229	Female.	108	165	26.2	13.8	4.5	11.2	10.3	15.3	4.3	Do.
Do	165230	...do....	87	132	21.8	12.2	4.0	10.9	8.3	13.0	4.2	Little worn.
Do	165231	...do....	96	152	23.7	12.8	4.1	10.9	8.9	14.4	4.1	Do.
Uganda: Nkyanuna	165236	Male....	103	150	24.2	13.2	4.1	11.3	10.0	14.8	4.1	Moderately worn.
T. m. oblitus.												
B. E. A.:												
Mount Sagalla	183810	Female.	100	150	23.7	13.2	4.2	10.9	9.3	14.6	3.8	Do.
Vol	[2] 17123	...do....	110	170	24.7	12.4	4.4	10.9	9.5	14.4	3.9	Do.

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[1] Type: U.S.N.M.

[2] Type; Field Mus. Nat. Hist., Chicago.

Specimens from the Sotik (Kabalolot Hill) although rather immature, are distinctly this species and not *T. surdaster polionops*, which occurs in the Mau Escarpment. The Sirgoit Lake specimen may possibly represent one of the forms described from Mount Elgon[1] which are not otherwise represented in our collection, but the specimen is preserved in alcohol and is not distinguishable from skins of *ibeanus*. This form evidently blends into *Thamnomys ibeanus lutosus* in the Northern Guaso Nyiro country, and specimens from this region are not easily placed. There are no specimens in our collection which approach in size the type skull of *Thamnomys gigas* Dollman, from Kenia. In describing this species Dollman, as usual, gives no clew to the age of the animal beyond the fact that it is "adult." This may mean anything beyond the condition when the last molar has erupted up to extreme senility, during which period the skull of any murine grows enormously. If the type skull of "*gigas*" is an old individual, with much worn teeth, I should suspect the name to be a synonym of *ibeanus*.

THAMNOMYS IBEANUS LUTOSUS Dollman.

1911. *Thamnomys surdaster lutosus* Dollman, Ann. and Mag. Nat. Hist., ser. 8, vol. 8, p. 657. November. (Mount Nyiro, British East Africa; type in British Museum.)

Specimens.—Twenty-two, from the following localities:

British East Africa: Isiola River, 1 in alcohol (Heller); Mount Gargues, 16 (Heller); Ngare Ndare River, 4 (Heller); Northern Guaso Nyiro, 1 in alcohol (Heller).

Heller found three large embryos each in females collected at Mount Gargues, August 23 and September 1.

THAMNOMYS DISCOLOR Thomas.

1910. *Thamnomys discolor* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 283. March. (Kakumega Forest, Kisumu, British East Africa; type in British Museum.)

Specimens.—Sixty-three, from localities as follows:

Uganda: Kampala, 1 (Loring).

British East Africa: Kaimosi, 62, including 17 in alcohol (Heller, Turner).

As usual in this genus, there is considerable variation in color among the skins of this series. The presence or absence of dark whisker marks and light supraorbital spots is a matter of individual variation. The type-specimen is described by Thomas as lacking both.

Heller records three embryos from a female collected at Kaimosi, February 1.

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[1] *Thamnomys surdaster elgonis* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 282, March, 1910; *Thamnomys surdaster insignis* Dollman, Ann. and Mag. Nat. Hist., ser. 8, vol. 7, p. 528. May, 1911.

THAMNOMYS MACMILLANI GAZELLÆ Thomas.

1910. *Thamnomys macmillani gazellæ* Thomas, Ann. and Mag. Nat. Hist., ser. 8. vol. 5, p. 282: March. (Chak-Chak, Bahr-el-Ghazal, Sudan; type in British Museum.)

Specimens.—Ten, as follows:

Lado: Rhino Camp, 8, including 1 in alcohol (Loring, Heller).

Uganda: Lialo, 1 (Loring); Nkyanuna, 1 (Loring).

THAMNOMYS MACMILLANI OBLITUS Osgood.

1910. *Thamnomys oblitus* Osgood, Field Mus. Zool. ser., vol. 10, No. 3, p. 16, April 7. (Voi, British East Africa; type in Field Mus. Nat. Hist.)

Specimen.—One, as follows:

British East Africa: Summit of Mount Sagalla, Taita Hills (Heller).

The type-specimen of *Thamnomys ochraceus* G. M. Allen[1] from the Meru River, north of Mount Kenia, is almost intermediate in coloration between our Lado skins of *T. macmillani gazellæ* and this Sagalla skin of *oblitus*. It is distinguished from *gazellæ* by its slightly paler coloration and uniformly colored upperparts (lacking the decidedly grayish head and shoulders of *gazellæ*) and from *oblitus* by its slightly darker, less bright ochraceous, dorsal coloration and larger hind foot. The three forms are closely related and doubtless intergrade.

Our specimen of *oblitus* almost exactly matches the type, which has been lent me by the Field Museum of Natural History. The species must be rare or difficult to collect, for on Heller's two visits to the Taita Hills he has captured only these two individuals, while at the same time large series of the commoner *polionops* were obtained.

Genus ŒNOMYS Thomas.

1904. *Œnomys* Thomas, Ann and Mag. Nat. Hist., ser. 7, vol. 13, p. 416. June. (*Œ. hypoxanthus.*)

The recognized forms of the rusty-nosed rats included in this genus are not well distinguished. It is clear from an examination of even our small series that almost all of the characters which have been assigned to various subspecies are merely individual variations, or differences in the color and skull due to age. I can distinguish three rather poorly marked forms in our collection from British East Africa, but would not be at all surprised if some of these eventually could not be maintained.

For measurements of specimens see page 65.

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[1] Bull. Mus. Comp. Zool., vol. 54, p. 442. April, 1912. The type has been lent me by the Museum of Comparative Zoology through the kindness of Mr. Samuel Henshaw.

ŒNOMYS BACCHANTE BACCHANTE (Thomas).

1903. *Mus hypoxanthus bacchante* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 12, p. 342. September. (Nandi, British East Africa; type in British Museum.)

1910. *Œ[nomys] bacchante* THOMAS AND WROUGHTON, Trans. Zool. Soc. London, vol. 19, p. 510. March.

1910. *Œnomys hypoxanthus bacchante* ROOSEVELT, African Game Trails, Amer. ed., pp. 473, 478; London ed., pp. 485, 490.

Specimens.—Ten, from localities as follows:

BRITISH EAST AFRICA: Aberdare Mountains, 4 (Heller); Mount Kenia, west side, 4 (Loring); Upper Nzoia River, Guas Ngishu Plateau, 1 (Heller); Wambugu, 1 (Loring).

Thomas has named a form of *Œnomys* from the Aberdares (*Œ. oris*) and one from Mount Kenia (*Œ. bacchante moerens*).[1] I can find no specimens in our collection from these localities which differ appreciably from the Nzoia River *bacchante* or resemble the animals described.

I assume that the type locality of *bacchante* is the old Nandi Station, some distance northeast of the new Nandi, and near the edge of the Nandi Escarpment. This is probably about the western limit of distribution of this dark race, which apparently gives way only a slight distance to the westward to the brighter, yellow-rumped form of Uganda and the immediate vicinity of Kavirondo Gulf.

The form of the antorbital plate has been commonly used as a distinguishing character for species and subspecies of *Œnomys*, and is used by Thomas and Wroughton in their key. While there may be slight average difference between specimens of exactly comparable age of different subspecies, still the change in the shape of this plate in *Œnomys* with the development of the masseter muscle is frequently so great that the character is of no practical value in separating forms.

Loring collected this species up to 10,700 feet on Mount Kenia and Heller trapped specimens on the summit of the Aberdares at 11,000 feet.

ŒNOMYS BACCHANTE EDITUS Thomas and Wroughton.

1910. *Œnomys bacchante editus* THOMAS AND WROUGHTON, Trans. Zool. Soc. London, vol. 19, p. 509. March. (Mubuku Valley, East Ruwenzori, Uganda; type in British Museum.)

Specimens.—Twenty-seven, as follows:

BRITISH EAST AFRICA: Kaimosi, 26, including 4 in alcohol (Heller); Yala River, 1 (Heller).

The specimens in this series differ from skins of *O. bacchante bacchante* in their paler general coloration and much brighter, more ochraceous, rumps and lower backs.

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 7, pp. 379–381. April, 1911.

Measurements of Specimens of Œnomys from British East Africa.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry without claws.	Skull: condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Interorbital breadth.	Length of mandible.	Upper tooth row.	Condition of molar teeth.
Œ. b. bacchante.												
Nzoia River	164487	Male	150	175	29	33.2	17.2	13.7	5.1	20.2	6.9	Moderately worn.
Aberdare Mountains	183614	...do	160	173	30	35.5	18.1	14.8	6.0	21.8	7.8	Do.
Do	164486	Female	155	180	29	32.5	17.3	14.0	5.0	20.3	7.4	Do.
Do	183615	...do	150	174	30	34.1	17.8	14.0	5.6	20.8	7.4	Do.
Mount Kenia	164491	Male	149	166	29	31.6	....	13.3	5.1	18.8	7.3	Little worn.
Do	164489	Female	162	190	31	....	....	....	....	22.3	7.5	Moderately worn.
Œ. b. editus.												
Kaimosi	183618	Male	155	183	30	33.3	17.6	13.9	5.2	20.0	7.1	Do.
Do	183620	...do	140	176	30	32.8	16.3	13.8	4.9	19.8	6.9	Do.
Do	183629	...do	150	195	31	33.9	16.8	14.0	5.4	19.5	7.4	Do.
Do	183633	...do	150	183	31	34.2	16.8	14.0	5.7	20.3	7.3	Do.
Do	183619	Female	135	170	29	31.8	15.7	13.3	5.0	19.2	6.5	Do.
Do	183623	...do	150	183	30	33.6	16.9	13.4	4.7	20.3	7.2	Do.
Do	183628	...do	160	192	31	35.2	18.2	14.3	5.3	21.2	7.5	Do.
Do	183630	...do	150	185	29	33.4	16.8	13.2	5.2	20.3	6.8	Do.
Do	183632	...do	155	193	30	35.4	17.9	14.2	5.5	21.4	7.4	Much worn.
Do	183634	...do	150	180	29	32.8	16.4	13.7	5.4	19.7	7.3	Moderately worn.
Œ. b. vallicola.												
Naivasha	162615	Male	156	179	30	33.6	17.2	14.0	5.0	20.3	7.6	Do.
Do	[1] 162614	Female	160	184	31	33.9	17.1	13.3	5.2	19.7	7.5	Do.

[1] Type.

The Ruwenzori *editus* has never been satisfactorily separated from a subspecies of *bacchante* described by Thomas from the Victoria Nile (*Œ. bacchante unyori*) in 1903. With a knowledge of the variations within species of this genus due to age or individual peculiarities, the two forms, from the descriptions only, seem very much alike. It is possible that this Kavirondo form should be called *Œnomys bacchante unyori.*

There is much variation within the Kaimosi series. The feet are especially variable in color, ranging from light buff, through deep ochraceous, to almost blackish. The amount of deep buff or pinkish buff bordering the lighter underparts is also exceedingly variable, as is the amount of ochraceous in the lower back and the general brightness of the pelage.

ŒNOMYS BACCHANTE VALLICOLA Heller.

Plate 19.

1914. *Oenomys hypoxanthus vallicola* Heller, Smithsonian Misc. Coll., vol. 63, No. 7, p. 11. June 24. (Lake Naivasha, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Four, as follows:

British East Africa: Lake Naivasha, 2 (Loring); Naivasha Station, 2 (Loring).

This is a very slightly marked form scarcely separable from the Kavirondo subspecies which I have called *editus.* Much larger series from the type region will be necessary satisfactorily to settle its status. The two adult specimens are extreme in brightness of the rump and lower back and the two younger skins are lighter colored than the few young of about the same age in the series of *editus.* There appear to be no satisfactory characters by which the skulls may be separated.

Genus RATTUS Fischer.

1803. *Ruttus* (misprint for *Rattus*) Fischer, Nationalmus. Naturg. Paris, vol. 2, p. 128. (*R. norvegicus.*)[1]

1827. *Rattus* Donovan, Nat. Repos., vol. 3, pl. 73, text p. 1 (1834). (*R. rattus.*)[2]

1881. *Epimys* Trouessart, Bull. Soc. Angers, vol. 10, p. 117. (*R. rattus.*)[3]

1915. *Æthomys* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 16, p. 477. December. (*R. kaiseri hindei.*)

1915. *Praomys* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 16, p. 477. December. (*R. tullbergi.*)

1915. *Myomys* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 16, p. 477. December. (*R. colonus.*)

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[1] For discussion of type-species of *Rattus* Fischer see Hollister, Proc. Biol. Soc. Washington, vol. 29, p. 126, June 6, 1916; Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 18, p. 240, August, 1916; and Hollister, Proc. Biol. Soc. Washington, vol. 29, pp. 206 207, Sept. 22, 1916.

[2] For note on type-species of *Rattus* Donovan see Hollister, Proc. Biol. Soc. Washington, vol. 29, p. 126, June 6, 1916.

[3] For note on type-species of *Epimys* Trouessart see Miller, Proc. Biol. Soc. Washington, vol. 23, pp. 57–60, April 19, 1910.

1915. *Mastomys* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 16, p. 477. December. (*R. coucha.*)
1916. *Rattus* HOLLISTER, Proc. Biol. Soc. Washington, vol. 29, p. 126. June 6.

The typical rats (Genus *Rattus*) of the African continent have been separated into five subgenera by Thomas in a recent paper.[1] As stated by Thomas, the detailed characters of these groups will need much further study, but he has presented a key based entirely on mammary formulæ by which his named subgenera may be distinguished if one possesses breeding female examples. From a study of the skulls and teeth of the rats of eastern Africa it is evident that these groups are of unequal value, though all will doubtless prove valid superspecific groups in the final revision. It is indeed probable that the number of subgenera should be increased rather than reduced. According to the arrangement of Thomas, the species listed in this paper apparently fall into the following subgenera:

Rattus s. s.—*Rattus rattus kijabius* (Allen).
  Rattus nigricauda loringi (Heller).
Æthomys.—*Rattus kaiseri helleri* Hollister.
  Rattus kaiseri medicatus (Wroughton).
  Rattus kaiseri noræ (Wroughton).
  Rattus kaiseri turneri (Heller).
  Rattus kaiseri hindei (Thomas).
  Rattus kaiseri manteufeli (Matschie).
  Rattus chrysophilus voi (Osgood).
Praomys.—*Rattus tullbergi jacksoni* (de Winton).
  Rattus tullbergi peromyscus (Heller).
  Rattus denniæ (Thomas).
  Rattus taitæ (Heller).
  Rattus stella kaimosæ (Heller).
Myomys.—*Rattus fumatus fumatus* (Peters).
  Rattus fumatus subfuscus (Osgood).
  Rattus tana (True).
Mastomys.—*Rattus coucha ismailiæ* (Heller).
  Rattus coucha ugandæ (de Winton).
  Rattus coucha tinctus Hollister.
  Rattus coucha neumani (Heller).
  Rattus coucha panya (Heller).
  Rattus coucha hildebrandtii (Peters).
  Rattus coucha durumæ (Heller).

The typical subgenus *Rattus* should probably be dropped from the East African list. The first species, *Rattus rattus kijabius*, would be better placed in a subgenus *Epimys;* and the proper allocation of *Rattus nigricauda loringi* is uncertain.

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 16, p. 477. December, 1915.

RATTUS RATTUS KIJABIUS (Allen).

1909. *Mus kijabius* Allen, Bull. Amer. Mus. Nat. Hist., vol. 36, p. 169. March 19. (Kijabe, British East Africa; type in Amer. Mus., New York.)

1911. *Mus* (*Epimys*?) *muansæ* Matschie, Sitz.-ber. Ges. nat. Freunde Berlin, 1911, p. 340. October. (Muansa, German East Africa; type in Berlin Mus.)

1916. *Epimys jujensis* Lönnberg, Arkiv för Zool., vol. 10, No. 12, p. 10. May. (Juja Farm, British East Africa; type in R. Nat. Hist. Mus., Stockholm.)

Specimens.—Fifty-nine, from the following localities:

British East Africa: Changamwe, 17, including 3 in alcohol (Mearns); Juja Farm, 7 (Loring, Mearns); Kapiti Plains, 11 (Loring); Mazeras, 13 (Heller); Mount Mbololo, 1 (Heller); Nairobi, 8, including 2 in alcohol (Mearns); Ulukenia Hills, 2 (Loring).

This rat has frequently been recorded from East Africa under the name *Epimys* (or *Mus*) *rattus*. Its origin is uncertain, but from the fact that it is found only along the railroad or about the older settlements and highways of trade, it may safely be assumed that the animal was introduced by man. No specimen in the museum series is typical of true *rattus* of northern Europe or of the subspecies *alexandrinus* of the Mediterranean shores of Europe and northern Africa. All are to a certain extent intermediate in color between these two forms and resemble very closely the known hybrids or crosses of *rattus* and *alexandrinus* frequently found in the southern United States. The series as a whole is very uniform in color and there is little variation in the shade of the underparts or feet. The color is about that described by Bonhote[1] for his "*typical alexandrinus*," which is clearly not the *alexandrinus* of Geoffroy.

This East African form of *rattus*, whatever its origin, has apparently had four distinctive names based upon it, *kijabius* Allen, 1909; *muansæ* Matschie, 1911; *rattiformis* Matschie, 1915;[2] and *jujensis* Lönnberg, 1916. Inasmuch as the form is certainly not typical of either *rattus* or *alexandrinus*, it seems best, until a more satisfactory solution of the case is worked out, to use for it the first name actually given to it in East Africa. Doctor Allen has kindly sent me for examination the type and three topotypes of his *Mus kijabius* for study in this connection and as they prove to represent the form under discussion the name *Rattus rattus kijabius* may be applied to it. The type is a young adult, but has the teeth worn more than usual at its age and considerably more than the teeth of the somewhat larger skull of another specimen in the type series.

Measurements of the type skull of *kijabius* (Amer. Mus. Nat. Hist., 27881, male) and of a topotype female, older, but with the teeth less worn (Amer. Mus. Nat. Hist. 27882) follow: Condylobasal length, 30.5, 32.3; breadth of braincase, 15, —; mastoid breadth, 14.2, 14.4; length of nasals, 11.5, 11.8; interorbital breadth, 5.4, 5.5; upper tooth row, alveoli, 6.4, 6.5. Both skulls are so young that they would ordinarily be excluded from tables of measurements of fully grown individuals.

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[1] Proc. Zool. Soc. London, 1910, p. 655. October.

[2] "*Mus* (*Epimys*) *rattiformis* Matschie, Sitz.-ber. Ges. Nat. Freunde, Berlin, 1915, pp. 98-99." Type locality, Amani, Usambara, German East Africa. I have not seen the description but judge that the animal is the East African "*rattus*."

One of our specimens from Juja Farm has been submitted to Doctor Lönnberg for comparison with the type of *Epimys jujensis*. Doctor Lönnberg writes that these specimens are very similar and probably belong to the same species. The Juja Farm specimens are unquestionably identical with Allen's *Mus kijabius*.

RATTUS NIGRICAUDA LORINGI (Heller).

Plate 20.

1909. *Thamnomys loringi* HELLER, Smithsonian Misc. Coll., vol. 52, pt. 4, p. 471. November 13. (Lake Naivasha, British East Africa; type in U. S. Nat. Mus.)

1910. *Mus loringi* OSGOOD, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 277. March.

1910. *Thamnomys loringi* ROOSEVELT, African Game Trails, Amer. ed., pp. 473, 478; London ed., pp. 485, 490.

1910. *Thamnomus loringi* ROOSEVELT, African Game Trails, Amer. ed., p. 484; London ed., p. 495.

Specimens.—Twenty-two, from localities as follows:

BRITISH EAST AFRICA: Lake Naivasha, 6 (Loring); Lime Springs, Sotik, 7, including 1 in alcohol (Heller); Loita Plains, 1 (Heller); Naivasha Station, 7 (Loring); Telek River, Sotik, 1 (Heller).

Specimens from the Sotik appear to be slightly grayer, less reddish, above; and with less clear slate color in the underfur of the lower parts than skins from the type region around Naivasha; but the difference is hardly sufficient to separate a race, especially as the series from the two localities were collected at different seasons.

Heller notes four embryos in a female from Loita Plains, April 27. Labels of two specimens from Lime Springs are marked: "Caught on limbs of acacia." Roosevelt and Heller[1] have written of these masked tree-rats:

> In the Rift Valley; common around Naivasha. Arboreal and nocturnal. Much the habits of our neotoma, but do not build large nests. Build nests about 6 inches in diameter, made of sticks, placed in the branches of thorn-trees; also in burrows near the bottom of the trunks; runways lead from the trees containing the nests to the burrows. Trapped on the ground and in traps set in notches of the trees.

For measurements of specimens see page 70.

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[1] Appendix B, African Game Trails, Amer. ed., p. 478. 1910.

Measurements of specimens of Rattus nigricauda loringi from British East Africa.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry, without claws.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Length of mandible.	Upper tooth row (alveoli).	Lower tooth row (alveoli).	Condition of molars.
Lake Naivasha	[1] 161904	Female	160	174	28.0	35.5	19.4	5.0	21.2	5.8	6.0	Moderately worn.
Do	162534	do	150	157	26.5			5.0	22.1	5.9	5.7	Do.
Do	162536	do	154	143	26.4	33.5	18.3	4.9	21.2	5.9	5.9	Do.
Naivasha Station	162539	do	155	161	27.3	36.4	19.3	4.9	21.8	6.2	5.8	Do.
Do	162541	do	153	143	27.1	34.0	18.9	5.1	21.9	5.9	5.8	Do.
Do	162543	do	137	156	28.2	32.1	16.5	4.8	20.4	5.9	5.7	Do.
Lime Springs	181718	Male	135	147	25.0	32.7	19.1	4.7	20.4	5.9	5.5	Do.
Do	181719	do	130	138	26.0	31.2	17.7	4.6	19.5	5.8	5.4	Do.
Do	181716	Female	150	183	26.8	35.1	19.7	5.1	21.9	5.9	5.6	Considerably worn.
Do	181720	do	135	155	26.6		17.4	4.6	19.5	5.8	5.4	Moderately worn.
Loita Plains	181722	do	150	163	27.0	32.6	18.3	4.8	20.5	5.8	5.4	Do.
Telek River	181723	Male	130	120	25.0	28.4	16.0	4.8	17.4	5.6	5.4	Little worn.

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[1] Type.

RATTUS KAISERI HELLERI Hollister.

Plate 19.

1914. *Epimys kaiseri centralis* Heller, Smithsonian Misc. Coll., vol. 63, No. 7, p. 10. June 24. (Rhino Camp, Lado; type in U. S. Nat. Mus.)

1918. *Rattus helleri* Hollister, Proc. Biol. Soc. Washington, vol. 31, p. 97. June 29. (New name for *Epimys kaiseri centralis* Heller, 1914, preoccupied by *Mus auricomis centralis* Schwann, Proc. Zool. Soc. London, 1906, p. 107.)

Specimens.—Forty-eight, from the type locality, as follows:

Lado: Rhino Camp, 48, including 5 in alcohol and 2 odd skulls (Loring, Heller, Mearns).

This is a slightly characterized form of the *kaiseri* group, in color very much like *Rattus kaiseri noræ*, of northern British East Africa, but averaging slightly smaller, with shorter hind foot and tail, and lighter dentition. I have not seen specimens of *Rattus kaiseri kaiseri* from Marungu. The specimens from Uganda, mentioned by Heller in the original description of "*centralis*" as somewhat less typical in character, I have placed with *Rattus kaiseri medicatus*, as they seem to go best with specimens of that subspecies. The Nile is apparently the dividing line between the two forms.

For measurements of specimens of rats of the *Rattus kaiseri* group see pages 73–75.

RATTUS KAISERI MEDICATUS (Wroughton).

1909. *Mus medicatus* Wroughton, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 540. December. (Mumias, British East Africa; type in British Museum.)

1918. *Rattus medicatus* Hollister, Bull. 99, U. S. Nat. Mus., pt. 1, p. 178. August 16.

Specimens.—Twenty-five, from the following localities:

Uganda: Gondokoro, 3, including 1 in alcohol (Loring); Hoima, 2, including 1 in alcohol (Loring); Kabula Muliro, 4, including 2 in alcohol (Loring); Kikanda, 2, including 1 in alcohol (Loring); Kisingo, 2, including 1 in alcohol (Loring); Lialo, 2, including 1 in alcohol (Loring); Lombeki River, 1 in alcohol (Loring); Nimule, 2 (Loring); Nkyanuna, 2, including 1 in alcohol (Loring).

British East Africa: Kaimosi, 2, including 1 in alcohol (Heller); Kakumega, 1 (Heller); Lukosa River, 1 (Heller); Sirgoit Lake, Guas Ngishu Plateau, 1 (Heller).

This long-tailed, grayish-buff subspecies of *kaiseri* is very like both *helleri* and *noræ* in color, and the boundaries of distribution for the three subspecies are difficult to define. The Nile appears to be a convenient separating line between *medicatus* and *helleri*, as the greatest break in dimensions comes at that point. The Uganda specimens listed above were all included by Heller with his "*centralis*," but seem best placed with the earlier described *medicatus*.

RATTUS KAISERI NORÆ (Wroughton).

1909. *Mus noræ* Wroughton, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 541. December. (Guasa Narok, Northern Guaso Nyiro, British East Africa; type in British Museum.)

Specimens.—Forty-five, from localities as follows:

British East Africa: Isiola River, 1 (Heller); Mount Gargues, 20, including 1 in alcohol and 1 odd skull (Heller); Mount Lololokwi, 19, including 1 in alcohol (Heller); Northern Guaso Nyiro, 5 (Heller).

This more northern subspecies of the common East African group of rats of the subgenus *Æthomys* is readily distinguished from the more southern *Rattus kaiseri hindei* by its more grayish, less reddish coloration and much longer tail. It is colored almost precisely like *R. k. helleri* of Lado, from which it differs in average size alone; and is perhaps scarcely separable from *R. t. medicatus*, which it even more resembles.

A female from 6,000 feet on Mount Gargues, August 28, contained four small embryos.

RATTUS KAISERI TURNERI (Heller).

Plate 21.

1914. *Epimys kaiseri turneri* Heller, Smithsonian Misc. Coll., vol. 63. No. 7, p. 8. June 24. (Kisumu, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Twelve, as follows:

British East Africa: Kisumu (Heller).

Heller states that these specimens were all collected in the papyrus beds on the margin of Kavirondo Bay. The form is doubtless confined to the shore of Victoria Nyanza, the higher country immediately back of the lake being occupied by the long-tailed, less richly colored *medicatus*. A female collected January 19 contained 3 embryos.

This is a rich reddish-tinted race of *kaiseri*, most resembling *hindei* in general coloration, but darker and with a still shorter tail than in that form.

RATTUS KAISERI HINDEI (Thomas).

1902. *Mus hindei* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 9, p. 219. March. (Machakos, British East Africa; type in British Museum.)

1910. *Epimys hindei* Roosevelt, African Game Trails, Amer. ed., pp. 473, 477; London ed., pp. 485, 489.

1914. *Epimys hindei* Cockerell, Miller, and Printz, Zool. Anz., vol. 44, p. 436, figs. 2, 2*a*. June.

Specimens.—Sixty-two, from the following localities:

British East Africa: Changamwe, 6, including 2 in alcohol (Mearns); Kapiti Plains, 2 (Loring); Machorra, Taita Hills, 7 (Heller); Mariakani, 1 (Heller); Mazeras, 12, including 1 in alcohol (Heller); Mount Sagalla, 5, including 1 in alcohol (Heller); Mount Mbololo, 6, including 3 in alcohol (Heller); Mount Umengo, 2 (Heller); Mtoto Andei, 4, including 1 in alcohol (Heller); Sir Alfred Pease's Farm, 2, including 1 in alcohol (Mearns); Ulukenia Hills, 15, including 1 in alcohol (Loring).

Measurements of the subspecies of Rattus kaiseri.

Locality.	No.	Sex.	Head and body.	Tail vertibræ.	Hind foot, dry, without claws.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Mastoid breadth.	Length of nasals.	Upper tooth raw, alveoli.	Condition of molars.
R. k. kelleri.												
Lado:												
Rhino Camp	[1] 165035	Male	148	162	27.5	35.1	18.9	5.8	14.9	15.2	5.9	Considerably worn.
Do	165038	...do	159	165	27.0	35.4	19.0	6.3	14.8	14.5	6.3	Do.
Do	165056	...do	156	148	28.5	34.5	18.2	5.6	13.7	15.0	6.3	Moderately worn.
Do	165059	...do	158	175	28.5	35.3	17.7	5.6	14.3	15.1	6.0	Do.
Do	165061	...do	153	150	26.5	34.1	17.9	5.7	13.9	14.4	6.2	Do.
Do	165071	...do	149	....	28.0	35.0	18.4	6.1	14.4	15.4	6.8	Much worn.
Do	165072	...do	158	160	28.0	34.0	17.5	5.6	14.2	15.0	6.2	Moderately worn.
Do	165076	...do	152	146	27.0	33.8	18.1	5.6	14.0	14.5	6.3	Do.
Do	165058	Female	160	156	27.5	32.3	16.4	5.4	13.5	13.8	6.1	Do.
Do	165074	...do	154	134	28.0	34.0	17.8	5.4	14.3	14.8	6.1	Do.
R. k. medicatus.												
Uganda:												
Gondokoro	165081	Male	168	156	27.5	35.3	18.2	5.9	14.5	15.3	6.0	Moderately worn.
Do	165082	...do	155	158	29.0	34.2	17.8	6.0	14.6	14.4	6.5	Do.
Kikanda	165031	...do	172	176	31.5	36.3	19.0	5.7	14.9	16.2	6.7	Do.
Lialo	165030	Female	158	165	29.0	35.0	18.8	4.9	14.5	15.0	6.7	Do.
Kabula Muliro	165027	Male	165	171	30.5	36.2	17.8	5.4	14.6	15.9	6.3	Do.
Do	165028	...do	158	163	30.0	35.0	17.8	5.7	14.8	16.0	6.5	Do.
B. E. A.:												
Sirgoit Lake	164466	Female	175	181	29.5	37.6	19.1	5.9	14.5	16.8	7.2	Considerably worn.
Kaimosi	183340	Male	165	179	30.0	36.3	19.3	6.0	14.6	15.8	6.3	Moderately worn.
Kakumega	183342	...do	155	169	30.0	35.0	17.3	5.8	14.4	15.2	6.4	Do.
Lukosa River	183341	...do	145	158	28.5	33.8	17.8	5.8	14.0	14.6	6.0	Do.

[1] Type.

Measurements of the subspecies of Rattus kaiseri—Continued.

Locality.	No.	Sex.	Head and body.	Tail vertibræ.	Hind foot, dry, without claws.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Mastoid breadth.	Length of nasals.	Upper tooth raw, alveoli.	Condition of molars.
R. k. noræ.												
B. E. A.:												
Nor. Guaso Nyiro	183382	Male	150	160	28.5	34.3	18.6	5.6	14.4	14.7	6.9	Moderately worn.
Do.	183383	...do.	150	169	29.5	34.0	17.6	5.6	13.9	14.3	6.5	Do.
Do.	183381	Female	150	178	31.0	35.2	17.2	5.5	13.8	15.1	7.0	Do.
Mount Lololokwi	183364	Male	150	170	27.5	34.6	17.9	5.6	14.6	15.6	6.8	Considerably worn.
Do.	183368	...do.	155	170	29.0	35.7	18.1	5.7	14.4	15.8	6.8	Moderately worn.
Do.	183378	...do.	163	196	29.0	36.9	19.4	6.1	15.6	15.2	6.8	Much worn.
Do.	183379	Female	155	194	31.0	35.5	18.4	5.7	14.8	15.9	6.8	Moderately worn.
Mount Gargues	183347	Male	170	182	29.5	37.7	19.2	6.3	14.7	16.8	6.8	Considerably worn.
Do.	183352	...do.	155	162	31.0	35.5	19.4	5.9	14.7	15.8	6.8	Moderately worn.
Do.	183357	...do.	150	178	30.0	35.0	18.3	5.7	14.2	15.6	6.8	Much worn.
Do.	183349	Female	150	185	28.5	35.0	18.5	5.4	14.2	15.8	6.9	Moderately worn.
R. k. turneri.												
B. E. A.:												
Kisumu	183343	Male	150	140	28.0	34.8	18.3	5.3	15.2	14.5	7.2	Moderately worn.
Do.	183388	...do.	150	130	27.0	34.4	18.7	5.4	14.9	14.6	7.0	Do.
Do.	183380	...do.	140	117	28.0	32.8	17.3	5.1	14.1	13.2	6.8	Little worn.
Do.	183392	...do.	150	128	28.0	34.2	18.2	5.5	15.0	14.5	6.9	Moderately worn.
Do.	183393	Female	155	120	27.0	34.6	18.7	5.4	15.2	15.1	6.7	Do.
Do.	[1] 183395	...do.	155	135	27.0	35.2	19.0	5.6	15.7	15.3	6.6	Do.
R. k. hindei.												
B. E. A.:												
Ulukenia Hills	162990	Male	151	141	27.0	33.5	18.2	5.5	14.1	14.8	6.3	Moderately worn.
Do.	163430	Female	150	143	26.5	34.3	18.3	5.4	14.9	16.2	6.3	Much worn.
Do.	163431	...do.	157	143	28.0	34.8	18.2	5.4	14.6	15.8	6.7	Considerably worn.
Do.	163432	...do.	165	153	26.5	35.9	18.4	5.8	15.1	14.8	6.3	Do.

Do.	163443	...do....	162	141	28.0	35.1	17.7	5.5	14.7	14.8	6.3	Moderately worn.
Machorra.	183318	...do....	160	152	29.0	36.5	19.0	5.8	15.4	15.8	6.7	Do.
Do.	183319	...do....	155	157	30.0	36.4	19.5	5.7	16.0	15.1	7.0	Do.
Do.	183322	...do....	155	150	28.5	35.7	19.4	5.5	15.6	15.0	6.4	Do.
Do.	183324	...do....	170	154	29.0	37.4	18.8	5.9	15.7	15.2	6.8	Much worn.
Mount Umengo.	183316	Male....	145	124	27.5	34.0	18.2	5.8	14.6	13.9	6.9	Moderately worn.
Do.	183317	Female.	150	135	26.5	33.7	18.3	5.4	15.0	13.5	6.5	Do.
Mount Sagalla.	183326	Male....	150	142	29.0	35.9	18.7	5.5	15.4	14.5	6.8	Do.
Do.	183327	...do....	140	134	28.0	33.0	16.7	4.9	14.5	18.2	6.2	Do.
Do.	183328	Female.	142	137	29.0	33.3	17.3	5.2	14.4	13.8	6.8	Do.
Mariakani.	183339	Male....	145	130	28.3	34.4	18.3	5.4	15.0	13.5	6.6	Do.
Mazeras.	183329	...do....	160	134	29.0	35.0	18.8	5.6	15.3	14.6	6.8	Do.
Do.	183331	...do....	160	135	29.0	36.2	18.9	5.7	16.2	14.2	6.6	Do.
Do.	183335	...do....	160	137	29.0	36.9	19.0	5.7	16.5	15.0	6.5	Do.
Do.	183330	Female.	160	138	28.5	36.0	18.8	5.8	15.1	14.3	6.8	Do.
Do.	183337	...do....	155	135	29.0	36.0	18.8	5.5	15.5	14.7	6.8	Do.
R. k. manteufeli.												
B. E. A.:												
Kabalolot Hill.	181680	Male....	155	135	27.0	34.6	18.9	5.2	15.8	15.1	6.6	Moderately worn.
Do.	181690	...do....	155	131	27.0	35.0	18.9	5.2	15.9	15.8	6.7	Considerably worn.
Do.	181682	Female.	160	122	27.0	35.9	19.5	5.5	15.2	14.4	6.8	Do.
Do.	181683	...do....	165	132	27.0	35.8	19.2	5.5	16.3	15.5	6.8	Do.
Do.	181684	...do....	160	145	27.0	34.9	13.6	5.4	15.2	14.6	6.5	Moderately worn.
Do.	181687	...do....	165	137	27.0	35.8	19.6	5.3	15.1	15.0	7.1	Do.
Do.	181692	...do....	150	135	28.0	33.7	18.2	5.5	14.8	14.5	6.9	Do.

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[1] Type.

Specimens of this rat from near the coast have shorter tails on the average than those from the type region, but the difference is not sufficient to make it necessary to recognize a separate subspecies. For measurements of specimens see page 74.

RATTUS KAISERI MANTEUFELI (Matschie).

1911. *Mus* (*Epimys*?) *manteufeli* MATSCHIE, Sitz.-ber. Ges. nat. Freunde Berlin, 1911, No. 8, p. 341. October. (Muansa, south coast of Victoria Nyanza, German East Africa; type in Berlin Museum.)

Specimens.—Forty-nine, from the following localities:

BRITISH EAST AFRICA: Engare Narok River, 1 (Loring); Kabalolot Hill, Sotik, 15, including 2 in alcohol (Heller); Loita Plains, 2 (Heller); Njoro Osolali, Sotik, 1 (Loring); Southern Guaso Nyiro River, 26, including 6 in alcohol (Loring, Heller); Telek River, 4 (Heller).

Specimens of the common Masai bush rat from the Southern Guaso Nyiro and Sotik are distinctly darker, more brownish and less reddish, than skins from east of the Rift valley. A form of this rat has been described by Matschie from the southern shores of Speke Gulf and it is highly probable that this is the subspecies of the lake drainage in the Sotik. I do not at any rate feel that a form from so near Matschie's type locality should be described without actual comparison with typical material and I see no reason for not referring the Sotik specimens to *manteufeli* until such time as direct comparisons can be made. The specimens in the collection agree well with the description.

Heller studied the type of *Mus manteufeli* in the Berlin Museum and made the following notes:

> Type A 182.11, Muansa, G. E. A.; in alcohol, skull extracted. Same color and size as *hindei*. Skull, condylo-incisive length, 36.3; zygomatic breadth, 19; tooth row, 6; length of incisive foramen, 8.2; diastema, 10.

A rat described by Dollman[1] from the Lemek Valley, between the Amala River and the Southern Guaso Nyiro, as *Epimys walambæ amalæ*, is apparently not represented in our collections. It differs conspicuously from the animal I have referred to *manteufeli* by its white ventral surface.

RATTUS CHRYSOPHILUS VOI (Osgood).

1910. *Mus voi* OSGOOD, Field Mus. Zool. ser., vol. 10, No. 2, p. 11. February. (Voi, British East Africa; type in Field Museum of Nat. Hist.)

Specimens.—Twenty-two, from the following localities:

BRITISH EAST AFRICA: Mount Mbololo, 1 in alcohol (Heller); Mount Sagalla, 7, including 1 in alcohol (Heller); Mtoto Andei, 1 (Heller); Ndi, 13 (Heller).

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[1] Abstract Proc. Zool. Soc. London, 1914, p. 25, April 14, 1914.

The specimen from Mtoto Andei appears to extend the known range of this rat in British East Africa. I am not aware of a previous record from north of the Taita Hills.

According to Mr. Thomas's classification of the groups of African *Rattus*, this species is a member of the subgenus *Æthomys*, along with the forms of *Rattus kaiseri* listed above.

RATTUS TULLBERGI JACKSONI (de Winton).

1897. *Mus jacksoni* DE WINTON, Ann. and Mag. Nat. Hist., ser. 6, vol. 20, p. 318. September. (Entebbe, Uganda; type in British Museum.)

1910. *Epimys jacksoni* ROOSEVELT, African Game Trails, Amer. ed., p. 473; London ed., p. 485.

1914. *Epimys tulbergi endorobæ* FRICK, Ann. Carnegie Mus., vol. 9, p. 8, pl. 2. June 6. (Not *Epimys endorobæ* Heller.)

Specimens.—One hundred and thirteen, from localities as follows:

UGANDA: Kabula Muliro, 4 (Loring); Kampala, 3 (Heller); Kikandwa, 1 (Loring); Kisimbiri, 1 (Loring).

BRITISH EAST AFRICA: Aberdare Mountains, 2 (Heller); Guas Ngishu Plateau, 12 and 30 miles north of Ravine, 5 (Heller); Kaimosi, 55, including 16 in alcohol (Heller, Turner); Kakumega, 2 (Heller); Kisumu, 2 (Heller); Lukosa River (Yala River), 3, including 1 in alcohol (Heller); Mount Kenia, 23, including 22 in alcohol (Heller, Loring); Nyuki River, 2 in alcohol (Heller); Ravine, 1 in alcohol (Heller); Wambugu, 9 (Loring).

In the series from Kaimosi are a few puzzling specimens which, after some hesitation, I have placed with this species. While the skulls of all other specimens listed above agree in presenting a very uniform appearance, these few skulls—about a dozen in all—differ in having shorter palatine slits, not reaching plane of first molar, and in almost complete absence of supraorbital ridges. Otherwise they show no distinguishing characters and the skins are absolutely inseparable from other skins in the Kaimosi series and from other parts of the range of *jacksoni*.

Heller found a female specimen at Kakumega February 15 with 3 fetuses; and two at Kaimosi, January 27 and February 3, each with four small embryos.

Many skins of *jacksoni* are indistinguishable by external characters from specimens of true *tullbergi* from West Africa.

For measurements of specimens of the subspecies of *Rattus tullbergi* see page 78.

RATTUS TULLBERGI PEROMYSCUS (Heller).

Plate 20.

1909. *Mus peromyscus* HELLER, Smithsonian Misc. Coll., vol. 52, pt. 4, p. 472. November 13. (Njoro O Nyiro, Sotik, British East Africa; type in U. S. Nat. Mus.)

1910. *Epimys peromyscus* ROOSEVELT, African Game Trails, Amer. ed., pp. 473, 477, and 484 (part); London ed., pp. 485, 489, and 495 (part).

Measurements of the subspecies of Rattus tullbergi.

Form and locality.		Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Ear, dry from notch.	Skull: Condylobasal length.	Zygomatic breadth.	Upper tooth row, alveoli.	Condition of teeth.
R. t. jacksoni.										
Uganda: Kabula Muliro	165100	Female	123	147	23.5	18	28.7	14.6	4.8	Considerably worn.
Kisimbiri	165099	...do	130	138	24.0	18	29.5	15.3	4.9	Do.
Kikanda	165101	Male	125	150	24.5	18	30.2	14.8	4.9	Do.
Kampala	165095	...do	123	140	23.0	17	29.0	15.2	5.2	Do.
Do	165096	Female	120	138	23.5	16	28.3	14.8	5.0	Moderately worn.
B. E. A.: Kaimosi	183450	Male	115	145	24.0	17	28.4	14.8	5.2	Do.
Do	183451	...do	110	142	25.0	16	28.7	14.7	5.4	Do.
Do	183473	...do	122	162	26.0	18	31.0	14.8	5.3	Do.
Do	183474	...do	120	153	25.5	18	30.0	14.7	5.3	Do.
Do	183475	...do	120	154	25.0	16	29.4	15.0	5.4	Much worn.
Do	183477	...do	120	145	24.0	19	30.1	15.0	5.2	Do.
Do	183448	Female	120	149	25.0	19	30.1	15.2	5.2	Considerably worn.
Do	183453	...do	110	140	24.0	18	28.8	14.6	5.0	Do.
Do	183454	...do	110	146	25.0	17	29.4	14.9	5.2	Moderately worn.
Do	183479	...do	120	142	24.5	17	29.3	14.8	5.0	Do.
Guas Ngishu	163353	Male	115	135	24.0	18	27.8	14.8	5.0	Do.
Do	163354	Female	116	133	23.0	18	28.3	14.1	5.2	Do.
Aberdares	183445	Male	105	135	24.0	17	29.4	14.8	5.4	Considerably worn.
Do	183444	Female	120	146	25.5	18	29.4	14.6	5.3	Do.
Mount Kenia	163346	...do	113	143	22.0	18	28.1	14.3	5.0	Do.
Wambugu	163405	Male	115	147	24.0	17	28.3	13.8	4.8	Do.
Do	163363	Female	121	162	23.0	19	28.5	14.8	4.8	Much worn.
Do	163404	...do	99	147	22.5	17	27.0	13.5	4.8	Moderately worn.
R. t. peromyscus.										
B. E. A.: Njoro O Nyiro	[1]161905	Male	135	146	25.0	20	30.5	15.7	5.5	Considerably worn
Engare Narok	162365	...do	121	141	24.0	20	29.6	14.6	5.5	Moderately worn.
Do	162368	...do	122	145	24.5	20	30.1	14.4	5.5	Do.
Do	162376	...do	115	137	23.5	19	28.9	14.5	5.4	Considerably worn.
Do	162382	...do	116	141	24.0	20	30.1	15.1	5.8	Much worn.
Do	162383	Female	103	127	23.5	18	26.3	13.8	5.0	Moderately worn.

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[1] Type.

Specimens.—Thirteen, from the following localities:

British East Africa: Engare Narok River, 12 (Loring); Njoro O Nyiro (Oljoro O Nyon), 1 (Heller).

This is a slightly marked form. It averages less reddish, more dusky, in color than *jacksoni*, and has larger ears and longer fur.

RATTUS DENNIÆ (Thomas).

Plate 21.

1906. *Mus denniæ* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 18, p. 144. August. (Ruwenzori East, Uganda, altitude 7,000 feet; type in British Mus.)

1910. *Mus denniæ* Thomas and Wroughton. Trans. Zool. Soc. London, vol. 19. p. 504. March.

1910. *Epimys endorobæ* Heller, Smithsonian Misc. Coll., vol. 56, No. 9, p. 3. July 22. (Western edge of Mau Forest, 25 miles north of Eldoma Ravine, British East Africa, altitude 8,600 feet; type in U. S. Nat. Mus.)

1910. *Epimys endorobæ* Roosevelt, African Game Trails, Amer. ed., p. 473; London ed., p. 485.

Specimens.—Forty-seven, from the following localities:

Uganda: Ruwenzori East, 1 (Dent).

British East Africa: Aberdare Mountains, 2 (Heller); Guas Ngishu Plateau, 25 and 30 miles north of Eldoma Ravine, 2 (Heller); West side of Mount Kenia, 42 (Loring, Mearns, Heller).

Specimens from British East Africa, representing Heller's *Epimys endorobæ*, do not differ enough from the Ruwenzori form to warrant recognition as a separate race. I can find no characters to distinguish our Ruwenzori specimen from many of the skins and skulls from Mount Kenia. The dark area between the nose and eye is sharply defined in the Ruwenzori skin and faintly indicated on many of the Kenia specimens, but the specimens were collected at widely different seasons and a few of the British East African skins, including the type of *endorobæ*, show the dark area very much as in the Uganda skin of *denniæ*.

For measurements of specimens, see page 80.

RATTUS TAITÆ (Heller).

Plate 21.

1912. *Epimys taitæ* Heller, Smithsonian Misc. Coll., vol. 59, No. 16, p. 9. July 5. (Mount Mbololo, Taita Hills, British East Africa, 5,000 feet altitude; type in U. S. Nat. Mus.)

Specimens.—Fifty, from the following localities:

British East Africa: Mount Mbololo, 41, including 18 in alcohol (Heller); Mount Umengo, 9 (Heller).

These specimens were all trapped in the heavy forests on the summits of the mountains. There appear to be no differences between skins from the two localities. A female from Mount Mbololo, November 5, contained five embryos; and one from Umengo, November 11, four embryos.

Measurements of specimens of Rattus dennix, R. taitx, and R. stella kaimosx.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Upper tooth row, alveoli.	Condition of teeth.
R. dennix.										
Uganda; Ruwenzori	172919	Female.	105	140	20.0	25.5	13.4	11.5	4.3	Considerably worn.
B. E. A.:										
Guas Ngishu	[1] 162888	Male	100	151	20.5	25.6	13.6	11.6	4.8	Moderately worn.
Do	163349	Female.	96	132	19.5	24.3	12.8	10.8	4.2	Little worn.
Aberdares	183312	Male	95	110	20.0	24.3	13.0	11.2	4.3	Moderately worn.
Do	163348	...do	120	153	21.5	27.3	14.4	12.1	4.5	Much worn.
Mount Kenia	163367	...do	105	151	21.5	26.0	13.7	11.5	4.4	Moderately worn.
Do	163369	...do	99	155	21.0	26.4	13.0	11.4	4.6	Do.
Do	163370	...do	89	....	22.0	25.7	12.8	11.5	4.8	Do.
Do	163371	...do	106	147	21.5	25.9	13.3	11.8	4.8	Do.
Do	163372	...do	105	147	20.5	25.6	13.3	11.5	4.4	Do.
Do	163374	...do	105	157	21.5	25.3	13.8	11.9	4.8	Do.
Do	163375	...do	108	152	21.0	26.2	13.5	11.8	4.4	Considerably worn.
Do	163376	...do	118	172	22.0	27.3	13.8	11.9	4.6	Much worn.
Do	163382	...do	119	170	22.0	26.2	13.3	11.3	4.4	Moderately worn.
Do	163386	...do	112	162	21.7	27.6	14.1	11.9	4.5	Do.
Do	163368	Female.	102	148	20.5	25.8	13.2	11.5	....	Much worn.
Do	163373	...do	95	142	20.5	25.6	13.7	11.7	4.6	Moderately worn.
Do	163377	...do	101	147	21.5	25.5	13.7	11.7	4.8	Do.
Do	163379	...do	108	157	21.5	26.2	13.4	11.6	4.3	Considerably worn.
Do	163381	...do	103	150	21.0	25.4	13.2	11.7	4.6	Do.
Do	163396	...do	102	157	20.5	26.0	13.3	11.3	4.7	Do.
R. taitx.										
B. E. A.:										
Mount Mbololo	[2] 181797	Male	105	138	22.0	26.1	13.1	11.0	4.4	Much worn.
Do	183413	...do	105	130	23.5	26.4	13.2	11.3	4.4	Do.

Do.	183414	...do....	100	135	24.0	26.4	13.0	10.9	4.5	Do.
Do.	183415	...do....	110	125	23.0	27.3	13.5	11.9	4.5	Do.
Do.	183416	...do....	105	129	24.0	25.5	13.4	11.1	4.5	Considerably worn.
Do.	183427	...do....	106	133	24.0	26.5	13.2	11.0	4.3	Do.
Do.	183428	...do....	110	132	22.5	26.3	13.4	11.3	4.3	Much worn.
Do.	183430	...do....	100	130	23.5	24.9	12.8	10.9	4.4	Considerably worn.
Do.	183431	...do....	100	122	23.0	25.2	13.0	11.9	4.4	Do.
Do.	183422	Female.	112	120	22.0	25.3	12.8	11.3	4.4	Do.
Mount Umengo	183436	Male....	100	124	22.5	25.4	12.8	11.3	4.2	Much worn.
Do.	183440	...do....	105	127	22.5	26.8	12.8	10.9	4.0	Do.
Do.	183434	Female.	102	124	22.5	25.0	12.8	11.7	4.3	Considerably worn.
Do.	183435	...do....	95	135	23.0	24.5	12.6	10.8	4.2	Moderately worn.
Do.	183441	...do....	95	128	23.0	25.0	12.6	10.8	4.2	Do.
R. s. kaimosæ.										
B. E. A.:										
Kaimosa	183184	Male....	85	136	18.0	22.4	11.7	10.2	3.9	Considerably worn.
Do.	[2] 181794	Female.	86	135	17.0	23.1	12.5	10.6	3.6	Do.
Do.	183182	...do....	88	138	18.0	....	....	....	3.8	Moderately worn.
Do.	183183	...do....	90	132	17.0	24.0	12.8	10.5	3.8	Much worn.

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[1] Type of *Epimys endorobæ* Heller.

[2] Type.

Externally this species is very much like *Rattus denniæ*, but the skulls of the two forms are very different. Skulls of *taitæ* are more slender and less angular than those of *denniæ;* they have smaller, flatter braincases and more sharply notched antorbital foramina.

For measurements of specimens see page 80.

RATTUS STELLA KAIMOSÆ (Heller).

Plate 22.

1912. *Epimys alleni kaimosæ* HELLER, Smithsonian Misc. Coll., vol. 59, No. 16, p. 7. July 5. (Kaimosi, Kakumega Forest, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Four, as follows:

BRITISH EAST AFRICA: Kaimosi (Heller).

I have had no specimens of typical *Rattus stella*[1] from the Ituri forest for comparison with these skins.

For measurements of specimens of *R. s. kaimosæ* see page 81.

RATTUS FUMATUS FUMATUS (Peters).

Plate 22.

1878. *Mus fumatus* PETERS, Mon.-ber. K. Preuss. Akad. Wiss. Berlin, March, 1878, p. 200. (Ukamba, British East Africa; type in Berlin Mus.)

1910. *Mus niveiventris* OSGOOD, Field Mus. Nat. Hist. Zool. ser., vol. 10, No. 2, p. 12. February. (Voi, British East Africa; type in Field Mus. Nat. Hist., Chicago.)

1910. *Epimys niveiventris ulæ* HELLER, Smithsonian Misc. Coll., vol. 56, No. 9, p. 3. July 22. (Ulukenia Hills, British East Africa; type in U. S. Nat. Mus.)

1910. *Epimys nieventris ulæ* ROOSEVELT, African Game Trails, Amer. ed., pp. 473, 478, 484; London ed., pp. 485, 489, 495. (Part; references to Athi Plains.)

Specimens.—One hundred and ten, from the following localities:

BRITISH EAST AFRICA: Kapiti Plains, 47, including 9 in alcohol (Loring); Mount Gargues, 12, including 1 in alcohol (Heller); Mount Mbololo, 1 (Heller); Mount Sagalla, 5 (Heller); Mtoto Andei, 1 (Heller); Ndi, 11 (Heller); Ulukenia Hills, 27, including 11 in alcohol (Loring); Voi, 6 (Heller).

In British East Africa there are two fairly well-marked subspecies of a small rat of the subgenus *Myomys*, representing *Rattus verroxi*[2] of South Africa. These two forms were first distinguished by Osgood in 1910 and were named as new, with type-localities in the Taita Hills (*niveiventris*) and at Lake Elmenteita (*subfuscus*). The two subspecies apparently reach their extremes of differentiation at these points, and specimens from intermediate localities are less typical and show a blending of characters of the two races, chiefly marked by the absence or presence of a grayish undercolor to the hairs of the otherwise white underparts. A subspecies, geographically intermediate, but most closely resembling the Taita Hills form, was named by Heller from the Ulukenia Hills (*ulæ*). The identity of this rock rat with the *Mus fumatus* of Peters was naturally unsuspected, but when Heller examined the types of East African mammals in Berlin he discovered that the type of *fumatus* is a young example of the East African form of *verroxi*, the *niveiventris* of Osgood. His manuscript notes on this type-specimen are as follows:

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[1] *Epimys stella* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 7, p. 590. July, 1911.

[2] *Mus verroxi* Smith, South Afr. Quart. Journ., vol. 2, p. 156, 1834 (*Epimys* or *Mus verreauxi* of authors). Reference verified for me by Oldfield Thomas at the British Museum.

> *Mus fumatus* Peters. Type No. 5277 Berlin Mus. Skin mounted. Skull with occipital part and floor of braincase lost. Very young; last molar just erupted. Locality Ukamba (probably Kitui). Hind foot, dry, from specimen, 20. Ears and all of tail except basal 2 inches lost. Color peculiar broccoli brown, belly and feet pure white. Interorbital region rounded, not beaded. Upper molars, 5; diastema, 5.7; nasals, 9.5 by 3; interorbital breadth, 3.7; condylo-incisive length of mandible, 16.

In the original description of *fumatus*, Peters gave the length of tail as 80 and the color of the underparts as "grauweiss." The immaturity of the specimen would account for both these differences from adult specimens of the East African representative of *Rattus verroxi*, but Heller has noted the belly of the type as "pure white."

I can not find characters by which to recognize three forms of this species in British East Africa, and although Ukamba specimens are somewhat intermediate in color between the two extremes, they are clearly nearest to the white-bellied subspecies of the Taita Hills. The skins from Mount Gargues average slightly grayer above than the specimens from Ulukenia Hills and other localities, but since the series is small and the differences trivial, it does not seem advisable to separate them from *R. fumatus fumatus*. They have the hairs of the underparts as clearly white to the bases as do the skins from Taita Hills. The range of the animal probably will be found to be practically continuous in rocky localities when more collecting has been done east of Mount Kenia.

Heller found four embryos in a female collected on Mount Gargues, September 1; and two embryos in a female from Ndi, November 3.

For detailed measurements of this subspecies and other forms of the subgenus *Myomys* see page 84.

RATTUS FUMATUS SUBFUSCUS (Osgood).

1910. *Mus niveiventris subfuscus* Osgood, Field Mus. Nat. Hist. Zool. ser., vol. 10, No. 2, p. 12. February. (Lake Elmenteita, British East Africa; type in Field Mus. Nat. Hist., Chicago.)

1910. *Epimys nieventris ulae* Roosevelt, African Game Trails, Amer. ed., p. 478; London ed., p. 489. (Part; references to Sotik, Naivasha, and Rift Valley.)

Specimens.—Seventy-one, from localities as follows:

British East Africa: Engare Narok River, 1 (Loring); Lake Naivasha, south end, 5 (Mearns, Loring); Naivasha Station, 27, including 6 in alcohol (Loring, Mearns); Oljoro O Nyon River, 4

Measurements of rats of the subgenus Myomys from British East Africa.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Upper tooth row, alveoli.	Condition of [illegible]
Rattus fumatus fumatus.										
Mount Sagalla	183513	Male	105	143	20.5	27.5	14.0	11.6	5.0	Much worn.
Do	183516	...do	102	138	21.5	26.6	13.6	11.0	5.1	Considerably worn.
Do	183514	Female	102	140	20.5	26.5	12.9	11.1	5.0	Do.
Do	183809	...do	100	133	21.5	26.1	13.4	11.0	4.9	Do.
Voi	183495	Male	100	140	20.5	26.2	12.8	10.8	4.8	Moderately worn.
Do	183496	...do	100	143	22.0	26.2	13.6	11.3	4.9	Considerably worn.
Do	183498	...do	100	136	20.5	25.6	13.2	11.2	4.5	Moderately worn.
Do	183499	...do	96	141	21.0	25.6	13.2	10.9	4.7	Do.
Ndi	183504	...do	112	157	21.5	27.5	13.7	11.3	4.9	Much worn.
Do	183502	Female	95	....	21.0	25.5	13.6	11.3	4.6	Moderately worn.
Do	183506	...do	105	153	23.0	28.4	14.2	11.8	5.2	Much worn.
Do	183507	...do	105	153	21.0	27.7	13.6	11.2	4.8	Do.
Do	183510	...do	105	141	22.0	25.6	13.1	10.8	4.8	Moderately worn.
Do	183511	...do	100	141	21.0	25.5	13.3	11.1	5.1	Do.
Ulukenia Hills	162886	Male	108	142	21.5	26.0	13.4	11.9	4.7	Considerably worn.
Do	164225	...do	106	138	20.0	25.8	13.7	11.7	4.5	Do.
Do	164232	...do	103	135	21.0	26.1	13.2	11.4	4.8	Do.
Do	164234	...do	106	137	21.0	26.9	13.7	11.2	4.8	Do.
Do	[1] 162887	Female	88	128	19.5	23.9	13.0	10.9	4.3	Moderately worn.
Do	164235	...do	100	130	19.5	25.1	12.8	10.8	4.8	Considerably worn.
Do	164237	...do	93	123	20.0	23.8	12.2	11.0	4.5	Moderately worn.
Kapiti Plains	161818	Male	97	124	21.5	25.3	13.5	11.5	4.8	Do.
Do	161827	...do	99	134	21.5	25.8	13.3	10.9	4.9	Do.
Do	161833	...do	96	130	21.5	25.6	13.3	....	5.1	Much worn.
Do	161834	...do	92	128	21.0	24.4	12.9	11.0	4.8	Moderately worn.
Do	161835	...do	96	137	21.5	25.7	13.3	11.2	5.3	Much worn.

Do.	161825	Female	105	136	20.0	26.0	13.6	11.0	4.8	Considerably worn.
Do.	161829	...do...	116	136	21.5	26.5	14.3	....	5.0	Much worn.
Do.	161836	...do...	100	127	20.0	25.2	13.0	10.9	5.0	Moderatoly worn.
Mount Gargues	183485	Male	102	146	20.5	26.1	13.8	11.3	4.8	Much worn.
Do.	183486	...do...	100	121	22.5	25.8	13.2	11.3	4.7	Moderately worn.
Do.	183484	Female	105	160	22.5	....	13.3	....	4.8	Much worn.
Do.	183434	...do...	95	135	22.0	25.2	13.7	11.4	4.5	Moderately worn.
Rattus fumatus subfuscus.										
Naivasha Station	162389	Male	100	127	20.5	24.7	13.2	11.2	4.8	Do.
Do.	162394	...do...	105	142	22.0	26.3	13.8	11.3	4.8	Do.
Do.	162504	...do...	109	150	20.5	25.9	13.4	11.3	4.8	Do.
Do.	162506	...do...	110	144	21.5	27.2	13.2	11.8	4.9	Do.
Do.	162393	Female	111	142	21.0	27.3	13.8	....	4.8	Considerably worn.
Do.	162496	...do...	106	139	21.5	26.3	14.0	11.1	4.7	Moderately worn.
Do.	162501	...do...	103	142	22.0	26.0	13.6	11.8	4.8	Do.
Do.	162502	...do...	101	141	21.5	25.8	13.3	11.6	4.8	Do.
Do.	162509	...do...	99	135	20.5	25.5	13.6	11.5	4.8	Do.
Southern Guaso Nyiro	162473	Male	105	155	22.0	26.5	13.3	11.3	4.8	Do.
Do.	162479	...do...	100	148	21.5	25.4	13.8	11.2	4.5	Do.
Do.	162480	...do...	107	141	21.5	25.9	13.0	11.2	4.6	Do.
Do.	162483	...do...	106	144	22.0	25.5	13.3	11.5	4.8	Do.
Do.	162472	Female	100	136	20.5	25.1	12.9	11.0	4.6	Considerably worn.
Do.	162476	...do...	115	149	21.5	26.6	13.3	11.3	4.5	Do.
Do.	162478	...do...	110	145	21.5	25.3	12.9	11.3	4.7	Do.
Do.	162481	...do...	105	141	21.5	25.3	12.8	11.3	4.9	Moderately worn.
Rattus tana.										
Tana River	[2] 36055	...do...	....	....	21.0	25.1	13.7	12.0	4.8	Do.

[1] Type of *Epimys niveiventris ulæ.*

[2] Type.

(Loring, Heller); Southern Guaso Nyiro River, 32, including 6 in alcohol (Loring, Mearns); Telek River, Sotik. 2 (Heller).

This is the subspecies of *fumatus* with the gray undercolor to the hairs of the otherwise white underparts. Around Naivasha the form is well marked, but specimens from the Southern Guaso Nyiro and Sotik sometimes have very little of the gray undercoloring on the belly, and resemble the Taita Hills and Ukamba skins. There are no pronounced differences in size or any other characters of consequence beyond this coloration of pelage to separate the two subspecies.

Never found except among rocks; we always found it where there were cliffs or stony koppies. Lives in crevices in the rocks and along the ledges of the cliffs. Nocturnal. (Roosevelt, African Game Trails, p. 478.)

RATTUS TANA (True).

Plate 22.

1893. *Mus tana* TRUE, Proc. U. S. Nat. Mus., vol. 16, p. 602. October 25. (Along the Tana River, between the coast and Hameye, British East Africa; type in U. S. Nat. Mus.)

1909. *Mus tana* LYON and OSGOOD, Bull. 62, U. S. Nat. Mus., p. 155. January 28.

Specimen.—One, the type:

BRITISH EAST AFRICA: Tana River, between the coast and Hameye (Chanler and von Höhnel).

The type-specimen of *Rattus tana* was originally preserved in alcohol, but was made up into a skin after about one year of immersion. The coloration is evidently considerably modified by this treatment and satisfactory comparison with other skins is impossible. True described it as "brownish-gray above, hoary below; feet white," which is about as accurate an account as can be given. There is a distinct undercolor of gray below, much as in many skins of *R. f. subfuscus*, but all the hairs of the underparts are broadly tipped with a light color which was presumably white before its discoloration. The tail in the dry skin measures 85 millimeters in length, but was recorded by True as 93, in the alcoholic specimen before skinning. The skull shows the type to be an adult specimen and has the teeth moderately worn. The measurements as given by True are probably of little value, as the specimen is much shrunken and was probably preserved in spirits much too strong for the purpose. The tail in the dry skin has been separated from the body and sewed in place, so that it is obviously considerably shortened from its original condition.

A careful comparison of the type of *R. tana* with all the forms of *Rattus* from East Africa in the collection proves it to be almost certainly a member of the subgenus *Myomys* closely related to *Rattus fumatus*. Until a satisfactory series of rats of this group is collected from the Tana River country it will be impossible to settle the exact status of *R. tana.* My own belief is that the form represented will prove to be a geographical race of *fumatus.* On the other hand skulls of certain specimens of *fumatus* are almost indistinguishable from skulls of some of the multimammate rats of the subgenus *Mastomys,* and this is particularly true of specimens in the "young adult" stage like the type skull of *tana.* The type of *tana* is recorded as a female, but no trace of mammæ can be found in the dry skin.

RATTUS COUCHA ISMAILIÆ (Heller).

Plate 23.

1914. *Epimys concha* (sic) *ismailiæ* HELLER, Smithsonian Misc. Coll., vol. 63, No. 7, p. 9. June 24. (Gondokoro, Uganda; type in U. S. Nat. Mus.)

Specimens.—Thirty-six, from localities as follows:

UGANDA: Gondokoro, 18, including 4 in alcohol (Loring); Ledgus, 1 in alcohol (Loring); Lombeki River, 1 (Loring); Mnyouri Jardin 1 (Loring); Nimule, 15, including 6 in alcohol and 1 odd skull (Loring, Heller).

The rats of this group, the subgenus *Mastomys,* known as the multimammate species, are among the most difficult of small mammals to arrange satisfactorily into species or subspecies. What appears to be individual variation within a single form is usually far more conspicuous than the characters marking valid geographical races. The difference in size, and frequently in color, between fully adult examples and the older, aged individuals is very great; and the change in the form and appearance of the skull throughout life is extreme. It is only when large series are available and when the skins and skulls are arranged according to age, as determined by the condition of the teeth, that the great variations are in a measure explained. My conclusions are that within the territory covered by this report only a single species of *Mastomys* is found, and that this species may be separated into several geographical races, no two valid forms occupying the same region. With smaller series of specimens one might easily be misled into describing several species, based mainly on size, form of the skull, and the coloration of the underparts. Size of body and size and form of skull are explained in almost every case with our material by age; and the color of the belly must frequently be accounted as purely individual variation, except in cases when it is plainly a question of condition of pelage. I have not seen authentic specimens of the two forms described by Dollman from Lake Baringo[1] which he found ranging together, and one of which, the smaller *effectus,* he states is distributed over the same territory occupied by *Rattus coucha ugandæ.* I can not help but believe, after my experience with the group, that these two names represent large and small individuals of the same subspecies, perhaps to be recognized as a valid race of *coucha* inhabiting the Baringo region.

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[1] *Epimys effectus* and *E. evelyni* Dollman, Ann. and Mag. Nat. Hist., ser. 8, vol. 7, pp. 524 and 526. May, 1911.

The Gondokoro race of *coucha*, described by Heller as *Epimys coucha ismailiæ*, is not a very well-marked form and differs from *Rattus coucha ugandæ* only in its brighter, more cinnamon rufous coloration, and smaller size, both of which are average characters, not entirely constant throughout the series. The color of the underparts is uniformly creamy whitish, more or less mixed with the gray of the underfur; no individuals with drab-colored bellies, not uncommon in other races, are in the collection. The largest specimens, and also the oldest as shown by the condition of the skulls and teeth, are decidedly grayish in color, with very little of the cinnamon tones characteristic of the average younger adult specimens of the race. Our specimens of this subspecies are all from the east side of the Nile in extreme northwestern Uganda, between Gondokoro and Nimule.

For detailed measurements of specimens of this subspecies, and of other forms of the subgenus *Mastomys*, see tables, pages 90–93.

RATTUS COUCHA UGANDÆ (de Winton).

1897. *Mus ugandæ* de Winton, Ann. and Mag. Nat. Hist., ser. 6, vol. 20, p. 317. September. (Entebbe, Uganda; type in British Museum.)

1910. *Epimys ugandæ* Roosevelt, African Game Trails, Amer. ed., p. 473; London ed., p. 485.

1918. *Rattus coucha ugandæ* Hollister, Smithsonian Misc. Coll. vol. 68, No. 10, p. 1. January 16.

Specimens.—Fifty-three, from the following localities:

Lado: Rhino Camp, 11, including 3 odd skulls (Loring).

Uganda: Hoima, 2, including 1 in alcohol and 1 odd skull (Loring); Kabula Muliro, 9, including 2 in alcohol and 1 odd skull (Loring); Kampala, 5, including 3 in alcohol (Mearns, Heller, Loring); Kikanda, 5 (Loring); Kikandwa, 2 (Loring); Kisimbiri, 2 (Loring); Kisingo, 9 (Loring); Lialo, 8 (Loring).

The distribution of this race is doubtless continuous between the Lado and the northern shores of Victoria Nyanza by way of eastern Belgian Congo and the Ruwenzori country. How far it extends northward on the eastern side of the White Nile before blending into the Gondokoro form, *Rattus coucha ismailiæ*, is not known, as no specimens are available from this district between the Victoria Nile and Nimule. The large, brown-bellied skins of *ugandæ* in the collection are usually those specimens with the largest, most angular skulls in which the teeth are very much worn. The majority of the specimens have grayish-white underparts.

RATTUS COUCHA TINCTUS Hollister.

Plate 23.

1918. *Rattus coucha tinctus* Hollister, Smithsonian Misc. Coll., vol. 68, No. 10, p. 1. January 16. (Kaimosi, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Nineteen, as follows:

British East Africa: Kaimosi (Heller).

This large, dark colored subspecies of *Rattus coucha* is known only from the type locality.

Heller found 10, 12, and 13 embryos in females of the type series collected in January, 1912.

Geographical races of *coucha* from Victoria Nyanza not represented in the United States National Museum collections are *Rattus coucha cuninghamei* (Wroughton)[1] described from Chivi Island and inhabiting other islands in the lake as well; and *Rattus coucha victoriæ* (Matschie)[2] from Mwanza, south coast of Speke Gulf. The former is described as having a very short tail and buffy white underparts; and *victoriæ* is said to be pure grayish white below. In *tinctus* the underparts are only slightly lighter than the flanks and are intense dark grayish buff, drab, or tawny olive.

RATTUS COUCHA NEUMANI (Heller).

Plate 23.

1912. *Epimys coucha neumani* Heller, Smithsonian Misc. Coll., vol. 59, No. 16, p. 8. July 5. (Neuman's Boma, Northern Guaso Nyiro River, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Four, as follows:

British East Africa: Neuman's Boma (Heller).

The material representing this subspecies is far from satisfactory. No one of the four specimens is sufficiently old to show the form or size of the skull with extreme age; the teeth of the type, the oldest specimen, are only moderately worn. The skins are all decidedly grayish in color, with little rufous or buffy above, and with the underparts washed with buff.

RATTUS COUCHA PANYA (Heller).

Plate 24.

1910. *Epimys panya* Heller, Smithsonian Misc. Coll., vol. 56, No. 9, p. 2. July 22. (Juja Farm, Athi Plains, British East Africa; type in U. S. Nat. Mus.)

1910. *Epimys panya* Roosevelt, African Game Trails, Amer. ed., pp. 473, 478; London ed., pp. 485, 489.

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[1] *Mus cuninghamei* Wroughton, Ann. and Mag. Nat. Hist., ser. 8, vol. 1, p. 256. March, 1908.

[2] *Mus (Epimys) microdon victoriæ* Matschie, Sitz.-ber. Ges. nat. Freunde Berlin, 1911, No. 8, p. 342, October.

Measurements of rats of the subgenus Mastomys.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Upper tooth row, alveoli.	Condition of molars.
R. c. ismailiæ.										
Uganda:										
Gondokoro	165102	Male	106	115	23	26.8	13.6	11.7	4.8	Moderately worn.
Do	165106	...do	107	122	22	25.2	14.0	11.7	4.6	Do.
Do	[1] 165108	...do	108	115	22	26.3	12.9	11.3	4.8	Do.
Do	165093	Female	113	99	25	27.8	13.6	12.2	5.6	Do.
Do	165104	...do	93	95	21	24.9	13.0	11.0	4.8	Do.
Do	165111	...do	105	111	22	26.9	12.8	11.3	5.1	Do.
Mnyouri Jardin	165019	...do	104	107	21	24.9	13.0	11.0	4.8	Do.
Lombeki River	165018	Male	96	96	21	24.2	12.6	11.1	5.1	Do.
Nimule	165015	...do	99	101	21	25.0	13.0	11.3	4.8	Do.
Do	165010	Female	99	108	22	25.7	13.3	11.3	5.0	Do.
Do	165011	...do	107	110	22	27.2	13.4	11.8	4.8	Do.
Do	165012	...do	103	100	21	26.0	13.4	11.7	5.0	Do.
Do	165013	...do	102	112	22	26.8	13.6	11.3	4.8	Do.
Do	165016	...do	99	96	22	24.2	12.7	11.2	4.8	Little worn.
R. c. ugandæ.										
Lado:										
Rhino Camp	165007	Male	114	108	22	27.2	13.9	11.4	4.9	Moderately worn.
Do	165009	...do	119	123	25	....	14.0	12.0	5.1	Do.
Do	165002	Female	117	105	22	27.0	14.3	11.9	4.9	Do.
Do	165004	...do	110	115	22	26.7	13.8	11.5	5.0	Do.
Uganda:										
Kikanda	164998	Male	131	130	24	29.0	14.5	12.1	4.9	Considerably worn.
Do	164999	...do	118	108	21	26.7	13.6	11.2	4.7	Do.
Do	165000	...do	124	128	22	28.0	13.8	11.6	4.8	Do.
Do	165001	Female	122	125	22	27.5	14.1	11.8	4.9	Do.
Lialo	164994	Male	115	112	22	28.3	13.4	11.9	4.8	Do.
Kisingo	164983	...do	126	116	22	28.2	14.3	12.0	4.7	Do.
Do	164986	...do	115	116	23	26.8	13.7	12.1	4.8	Moderately worn.

Do.	164987	...do.	125	114	23	20.4	14.4	11.8	5.0	Considerably worn.
Do.	164988	Female.	105	108	21	26.7	13.8	11.4	5.2	Moderately worn.
Do.	164990	...do.	107	117	22	26.7	13.3	11.9	5.0	Do.
Kabula Muliro	164981	Male.	120	114	21	28.1	14.1	12.3	4.9	Considerably worn.
Do.	165087	...do.	157	138	26	33.2	17.5	13.5	4.9	Very much worn.
Do.	164980	Female.	123	110	21	27.8	14.3	11.8	4.6	Moderately worn.
Kikandwa	165090	...do.	147	125	25	29.8	14.4	12.7	5.3	Considerably worn.
Kisimbiri	165094	Male.	140	124	24	30.8	14.7	12.9	5.1	Do.
Do.	165093	Female.	127	118	24	28.7	13.8	12.2	5.1	Do.
R. c. tinctus.										
B. E. A.:										
Kaimosi	[1] 183294	Male.	160	133	26	33.3	16.8	13.6	5.5	Moderately worn.
Do.	183295	...do.	160	148	30	35.0	17.9	14.3	5.8	Much worn.
Do.	183298	...do.	145	130	26	31.3	14.7	12.8	5.4	Moderately worn.
Do.	183302	...do.	130	120	24	25.5	13.9	12.3	5.0	Do.
Do.	183309	...do.	145	128	26	31.8	16.3	12.8	5.1	Considerably worn.
Do.	183311	...do.	120	120	24	28.6	13.6	12.2	4.9	Moderately worn.
Do.	183724	...do.	125	119	22	28.7	13.5	11.7	4.8	Do.
Do.	183291	Female.	100	112	23	27.4	13.3	11.8	5.1	Do.
Do.	183297	...do.	135	129	25	28.9	14.5	12.3	5.2	Do.
Do.	183300	...do.	140	130	27	20.7	14.6	12.7	5.3	Do.
Do.	183303	...do.	115	108	24	27.1	13.2	12.2	5.0	Do.
Do.	183305	...do.	130	127	25	30.3	14.9	12.8	5.2	Do.
Do.	183306	...do.	160	143	25	34.0	17.4	13.5	5.3	Much worn.
Do.	183307	...do.	142	142	24	32.1	16.1	12.7	5.3	Do.
Do.	183310	...do.	140	131	26	32.5	16.7	13.2	5.6	Do.
R. c. neumani.										
B. E. A.: Neuman's Boma	[1] 181795	Male.	115	128	26	28.4	13.9	12.2	5.0	Moderately worn.
R. c. panya.										
B. E. A.:										
Nyeri	163675	...do.	116	113	23	28.7	14.0	11.7	5.1	Do.
Do.	163676	...do.	114	110	23	28.2	13.3	11.8	5.2	Do.
Do.	163677	Female.	130	115	24	29.3	14.1	12.0	5.4	Do.
Wambugu	163681	Male.	140	128	25	30.1	14.6	12.0	5.1	Considerably worn.

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[1] Type.

Measurements of rats of the subgenus Mastomys—Continued.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Upper tooth row, alveoli.	Condition of molars.
B. E. A.—Continued.										
Wambugu	163723	Male	112	97	22	28.9	14.2	12.9	4.9	Moderately worn.
Do	163688	Female	146	140	24	30.3	15.1	12.0	5.0	Do.
Do	163736	...do	124	115	22	26.9	13.8	12.2	4.7	Do.
Fort Hall	163691	Male	116	97	23	28.7	13.4	11.8	4.9	Do.
Do	163701	...do	122	126	23	28.8	14.1	12.0	4.9	Considerably worn.
Do	163702	...do	131	130	23	30.6	14.0	12.2	5.3	Do.
Do	163710	Female	127	113	22	29.3	14.3	11.9	5.0	Much worn.
Saba Saba	163746	Male	127	128	24	31.0	14.7	12.5	5.4	Considerably worn.
Do	163747	...do	134	119	22	30.3	14.7	12.7	5.0	Do.
Do	163749	Female	124	123	24	29.7	14.3	12.3	5.1	Do.
Juja Farm	161859	Male	109	104	22	27.3	13.8	12.0	5.1	Moderately worn.
Do	161865	...do	129	112	....	29.2	14.3	12.6	5.2	Do.
Do	161884	...do	126	128	24	28.9	14.3	12.6	5.3	Do.
Do	[1] 161886	...do	119	119	22	27.1	13.8	11.6	4.8	Do.
Do	161892	...do	113	104	22	28.0	13.9	12.2	5.2	Do.
Do	161895	...do	130	120	23	30.9	15.6	12.9	5.2	Considerably worn.
Do	161802	Female	130	128	23	28.3	14.6	12.3	5.1	Moderately worn.
Do	161866	...do	131	110	23	28.0	13.7	11.7	5.3	Do.
Do	161871	...do	129	117	21	29.2	14.9	12.3	5.1	Considerably worn.
Do	161883	...do	106	106	22	27.2	13.8	11.8	5.0	Moderately worn.
Do	161888	...do	106	119	22	27.2	13.4	12.2	4.8	Do.
R. c. hildebrandtii.										
B. E. A.:										
Mtoto Andei	181651	Male	120	112	22	28.8	15.1	12.2	5.4	Much worn.
Do	181652	...do	126	118	23	28.8	14.9	12.7	5.3	Do.
Do	181646	Female	120	112	22	28.3	14.3	12.0	5.4	Considerably worn.
Do	181647	...do	130	112	22	29.4	14.3	12.2	5.4	Much worn.
Do	181649	...do	120	104	21	27.6	14.3	11.9	4.8	Do

Ndi	183249	Male	110	119	22	27.0	13.3	11.8	4.8	Considerably worn
Do.	183250	...do...	105	110	23	25.7	12.7	11.3	5.1	Moderately worn.
Voi	183287	...do...	125	123	24	29.5	14.3	12.7	5.3	Considerably worn
Mount Mbololo	183263	...do...	112	108	23	28.1	13.6	12.4	5.3	Do.
Do.	183255	...do...	130	118	23	28.3	14.8	12.1	4.9	Do.
Do.	183260	Female	120	116	21	28.4	14.4	12.1	5.1	Much worn.
Mount Sagalla	183268	Male	115	117	23	27.4	13.7	11.9	5.2	Moderately worn.
Do.	183271	...do...	125	124	24	29.9	14.9	12.6	5.4	Much worn.
Do.	183272	...do...	125	128	23	29.7	14.9	12.5	5.2	Do.
Do.	183275	...do...	120	121	23	29.8	14.7	12.0	5.2	Considerably worn.
Do.	183276	...do...	120	118	23	28.8	15.2	12.5	5.2	Much worn.
Do.	183278	...do...	115	120	24	28.5	14.0	11.8	5.2	Considerably worn.
Do.	183284	...do...	130	131	24	30.2	15.7	12.9	5.3	Do.
Do.	183273	Female	115	118	23	28.9	15.2	12.3	5.2	Much worn.
Do.	183274	...do...	120	119	23	28.8	13.3	11.9	5.1	Moderately worn.
R. c. durumæ.										
B. E. A.:										
Maji-ya-chumvi	183205	Female	108	128	23	28.5	14.1	12.4	5.6	Do.
Mariakani	183246	Male	125	124	24	29.4	14.8	12.6	5.4	Do.
Mazeras	[1] 181796	...do...	135	118	24	30.7	14.8	12.3	5.4	Do.
Do.	183208	...do...	128	114	23	28.1	14.1	12.2	5.3	Do.
Do.	183216	...do...	115	117	24	28.1	14.1	11.9	5.4	Do.
Do.	183217	...do...	112	115	24	28.7	14.2	12.3	5.5	Do.
Do.	183218	...do...	120	110	21	27.5	13.8	11.9	5.2	Do.
Do.	183220	...do...	110	106	23	26.3	13.7	11.9	5.1	Do.
Do.	183226	...do...	115	105	23	28.2	13.8	11.9	5.4	Do.
Do.	183227	...do...	115	114	22	28.1	14.2	12.1	5.3	Do.
Do.	183228	...do...	116	118	23	28.4	14.1	12.2	5.4	Do.
Do.	183231	...do...	120	120	24	28.9	13.9	12.1	5.3	Do.
Do.	183238	...do...	130	103	22	29.5	15.0	12.5	5.8	Considerablyworn.
Do.	183211	Female	105	106	22	25.8	13.2	11.5	5.3	Moderatelyworn.
Do.	183214	...do...	130	123	24	28.7	14.1	12.3	5.5	Do.
Do.	183229	...do...	125	114	22	28.0	14.1	12.0	5.3	Do.
Do.	183234	...do...	118	105	22	27.8	12.9	11.7	5.2	Do.

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[1] Type.

Specimens.—One hundred and sixty-nine, from the following localities:

British East Africa: Fort Hall, 22, including 2 in alcohol (Loring); Juja Farm, 46, including 5 in alcohol (Loring, Mearns); Kapiti Plains, 1 (Mearns); Lake Naivasha, 2 (Mearns, Loring); Meru Boma, 6 in alcohol (Heller); Mount Kenia, west slope, 3, including 2 in alcohol (Heller); Njoro Osolali, 1 (Loring); Nyeri, 7, including 1 in alcohol (Loring); Saba Saba, 16, including 3 in alcohol (Loring); Southern Guaso Nyiro, 1 (Loring); Suswa Plain, 2 (Heller); Ulukenia Hills, 16, including 4 in alcohol (Loring); Wambugu, 46, including 5 in alcohol (Loring, Mearns).

This rat appears to be the most common species about fields and dwellings throughout its range in British East Africa. It is an exceedingly variable species and the large series of specimens listed above contains skins presenting a wide degree of difference between the darkest, almost blackish animals and the palest, buffy brown individuals. There are skins from almost every general locality with light grayish or creamy white underparts and others with buffy or even drab bellies. Loring found seven embryos in a female from Juja Farm, May 18, and 10 in another female from the same place May 21.

Specimens of multimammate rats from Meru Boma and Fort Hall have been listed by Doctor Lönnberg[1] under *Epimys effectus* Dollman, described from Baringo. I can not find sufficient difference between skins from the Athi Plains and other southern localities and those from the vicinity of Kenia to recognize two races in our collection.

RATTUS COUCHA HILDEBRANDTII (Peters).

1878. *Mus hildebrandtii* Peters, Mon.-ber. K. Preuss. Akad. Wiss. Berlin, 1878, p. 200. (Ndi, Taita, British East Africa; type in Berlin Museum.)

Specimens.—Sixty-six, from localities as follows:

British East Africa: Macharra, Taita Hills, 1 (Heller); Mount Mbololo, 18, including 8 in alcohol (Heller); Mount Sagalla, 19, including 2 in alcohol (Heller); Mount Umengo, 2 (Heller); Mtoto Andei, 12 (Heller); Ndi, 6 (Heller); Voi, 5 (Heller).

German East Africa: Mount Kilimanjaro, 3 (Abbott).

The series of specimens of this subspecies of *Rattus coucha* presents a very uniform appearance in color and size. The upperparts are a dull reddish brown and the underparts rather light grayish buff. Heller examined the type-specimen in the Berlin Museum and made the following manuscript notes:

> *Mus hildebrandtii* Peters. Type. Skull perfect; old, molars worn flat. Skin stuffed, ears and tail perfect. Color quite brownish, not gray; dorsal region blackish; sides buffy ochraceous; belly suffused with buff. Foot on skin measures 23 millimeters. Labeled Noi, Taita. The "Noi" doubtless means Ndi.

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[1] Kungl. Sv. Vet. Akad. Handl., vol. 48, No. 5, p. 92. 1912.

RATTUS COUCHA DURUMÆ (Heller).

Plate 24.

1912. *Epimys coucha durumæ* Heller, Smithsonian Misc. Coll., vol. 59, No. 16, p. 9. July 5. (Mazeras, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Sixty, from localities as follows:

British East Africa: Changamwe, 9, including 2 in alcohol (Mearns); Maji-ya-chumvi, 3 (Heller); Mariakani, 2 (Heller); Mazeras, 46, including 7 in alcohol (Heller).

The specimens of this subspecies average much grayer in color than those of the nearly related *R. c. hildebrandtii.* Breeding records are noted on labels of females from Mazeras as follows: December 22, seven embryos; December 23, eight embryos; December 24, eleven large embryos.

Genus MUS Linnæus.

1758. *Mus* Linnæus, Syst. Nat., ed. 10, vol. 1, p. 59. (*M. musculus.*)

Curiously enough the common house mouse (*Mus musculus*) is not represented in our British East African collections. The native species of the genus have so far, it would seem, held their territory from this invader.

For detailed measurements of specimens of *Mus* see pages 98–101.

MUS TRITON TRITON (Thomas).

Plate 24.

1909. *Leggada triton* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 548. December. (Kirui, Elgon, British East Africa; type in British Museum.)

1910. *Leggada naivashæ* Heller, Smithsonian Misc. Coll., vol. 54, [No. 1924], p. 2. February 28. (Base of Aberdare Mountains, eastern edge of Naivasha Plains, British East Africa; type in U. S. Nat. Mus.)

1910. *Mus* (*Leggada*) *triton naivashæ* Roosevelt, African Game Trails, Amer. ed., p. 473; London ed. p. 485.

Specimens.—Two hundred and sixteen, from the following localities:

Uganda: Kikandwa, 3, including 1 in alcohol (Loring); Kisimbiri, 2 (Loring).

British East Africa: Aberdare Mountains, 5, including 1 in alcohol (Heller); Burgunett River, Meru Road, 1 (Heller); Fort Hall, 1 in alcohol (Loring); Isiola River, 1 (Heller); Kaimosi, 51, including 28 in alcohol (Heller); Kakumega, 6 (Heller); Kibabe, Kisumu, 1 (Heller); Lake Naivasha, 27, including 5 in alcohol (Loring); Lukosa River, 5, including 2 in alcohol (Heller); Mission, Kisumu, 1 (Heller); Mount Kenia, west side, 46, including 31 in alcohol (Loring, Mearns); Nyangnori, 1 (Heller); Nyeri, 36, including 25 in alcohol (Loring); Nyuku River, Meru Road, 1 in alcohol (Heller); Nzoia River, Guas Ngishu Plateau, 8, including 6 in alcohol (Heller); Wambugu, 20, including 6 in alcohol (Loring).

There is much purely individual variation in the amount of blackish on the feet and tail. I can find no characters by which to distinguish as a separate subspecies the specimens representing Heller's *Leggada naivashæ*. Specimens from Kisimbiri and Kikandwa, on the upper Victoria Nile, evidently slightly approach in color *Mus triton fors* of Ruwenzori, but are not sufficiently different to separate from *triton* proper. In this connection it is interesting to note that the names *triton* and *fors* as members of this genus, were published simultaneously, and *triton* has only a single line priority. The name *fors* is usually cited from the Ruwenzori report,[1] with Thomas and Wroughton as its authorities. As a matter of fact it was published as a valid name by Thomas in December, 1909, in the description of *Leggada triton*, where the greatest length of the skull of the type specimen is given.

MUS TRITON MURILLA (Thomas).

1910. *Leggada triton murilla* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 91. January. (Machakos, British East Africa; type in British Museum.)

1910. *Mus* (*Leggada*) *triton murillus* ROOSEVELT, African Game Trails, Amer. ed., p. 473; London ed., p. 485.

Specimens.—Eighteen, from localities as follows:

BRITISH EAST AFRICA: Fort Hall, 1 (Loring); Kamiti Farm, Athi Plains, 1 (Loring); Kapiti Plains, 12, including 2 in alcohol (Loring); Oljoro O Nyon River, 1 (Loring); Southern Guaso Nyiro River, 1 (Loring); Thika River, 2 (Loring).

This gray form of *triton* is evidently restricted to the region south of the upper Tana and Athi rivers, extending westward to the Mau Escarpment. It is a very well marked subspecies.

MUS EMESI Heller.

Plate 25.

1911. *Mus musculoides emesi* HELLER, Smithsonian Misc. Coll., vol. 56, No. 17, p. 5. February 28. (Kabula Muliro, Uganda; type in U. S. Nat. Mus.)

Specimens.—Twenty, from the following localities:

UGANDA: Hoima, 2, including 1 in alcohol (Loring); Kabula Muliro, 1 (Loring); Kikanda, 1 in alcohol (Loring); Kikandwa, 4, including 1 in alcohol (Loring); Kisimbiri, 8, including 3 in alcohol (Loring); Kisingo, 3 in alcohol (Loring); Nkyanuna, 1 (Loring).

This white-bellied mouse is clearly related to *M. triton*, but must be classed as a full species as it is found ranging with that form at localities in western Uganda. Its range appears to be much more restricted than is the distribution of *triton*. In size, the skull of *emesi* is intermediate between skulls of *triton* and those of *bellus* and *gratus*.

For measurements of specimens see page 99.

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[1] Trans. Zool. Soc. London, vol. 19, p. 506. March, 1910.

MUS BELLUS ENCLAVÆ Heller.

Plate 25.

1911. *Mus bellus enclavæ* HELLER, Smithsonian Misc. Coll., vol. 56, No. 17, p. 8. February 28. (Rhino Camp, Lado; type in U. S. Nat. Mus.)

Specimens.—Twenty-five, from localities as follows:

LADO: Rhino Camp, 21, including 10 in alcohol (Loring).

UGANDA: Butiaba, 3, including 1 in alcohol (Loring, Heller); Kampala, 1 (Loring).

This dark form of *bellus* seems to be confined to the west side of the Nile in the latitude of the type locality, Rhino Camp; but further south, in Uganda, it is found in the region between Albert Nyanza and Victoria Nyanza. It is readily separable from *Mus emesi* by its smaller size and smaller skull.

For measurements see page 99.

MUS BELLUS GONDOKORÆ Heller.

Plate 25.

1911. *Mus bellus gondokoræ* HELLER, Smithsonian Misc. Coll., vol. 56, No. 17, p. 8. February 28. (Gondokoro, Uganda; type in U. S. Nat. Mus.)

Specimens.—Two, as follows:

UGANDA: Gondokoro, 1 (Loring); Ledgus, 1 in alcohol (Loring).

This is a very light colored form of *bellus*, contrasting sharply with the dark subspecies from Lado and the Albert Nyanza region.

MUS BELLUS BELLUS (Thomas).

1910. *Leggada bella* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 87. January. (Machakos, British East Africa; type in British Museum.)

1910. *Mus* (*Leggada*) *bellus* ROOSEVELT, African Game Trails, Amer. ed., p. 472; London ed., p. 484.

Specimens.—Thirty-five, from the following localities:

BRITISH EAST AFRICA: Archer's Post, 1 (Heller); Engare Ndare River, 1 (Heller); Fort Hall, 1 (Loring); Juja Farm, 6 (Loring); Kapiti Plains, 14, including 11 in alcohol (Loring, Mearns); Meru, 2 in alcohol (Heller); Mount Gargues, 3 (Heller); Mount Lololokwi, 3 (Heller); Northern Guaso Nyiro River, 1 in alcohol (Heller); Saba Saba, 1 (Loring); Thika River, 1 (Loring); Ulukenia Hills, 1 (Loring).

MUS BELLUS VICINUS (Thomas).

1893. *N*[*annomys*] *minimus* TRUE, Proc. U. S. Nat. Mus., vol. 16, p. 603. (Specimen from Wange, Manda Island; not *N. minimus* Peters, 1852; not *Mus minimus* White 1789.)

1910. *Leggada bella vicina* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 88. January. (Takaungu, near Mombasa, British East Africa; type in British Museum.)

Specimens.—Seven, from localities as follows:

BRITISH EAST AFRICA: Changamwe, 1 (Mearns); Mariakani, 1 (Heller); Mount Mbololo, 2, including 1 in alcohol (Heller); Mount Sagalla, 2, including 1 in alcohol (Heller); Wange, 1 in alcohol (Denhardt).

Measurements of specimens of Mus.

Form and locality.	No.	Sex.	Head and body	Tail vertebræ.	Hind foot, dry, without claws.	Skull: Condylobasal length.	Zygomatic breadth.	Breadth of braincase.	Length of nasals.	Length of mandible.	Upper tooth row.	Condition of molar teeth.
M. t. triton.												
Uganda:												
Kisimbiri	165241	Male	81	52	15.8	....	10.3	9.7	8.1	12.5	3.5	Moderatelyworn.
Do	165242	...do	73	45	15.9	19.8	10.1	9.5	7.5	12.2	3.6	Do.
Kikandwa	165243	...do	69	55	15.0	19.3	9.9	9.5	7.5	12.2	3.5	Do.
Do	165244	...do	71	52	15.4	19.4	10.3	9.7	7.5	12.3	3.8	Do.
B. E. A.:												
Kaimosi	183568	...do	72	....	14.2	19.3	10.1	9.7	7.8	11.8	3.6	Considerably worn.
Do	183574	...do	78	53	14.8	20.7	10.5	9.9	8.2	12.4	3.8	Much worn.
Do	183580	...do	70	54	15.3	19.4	9.4	9.2	7.6	11.9	3.6	Moderately worn.
Do	183586	...do	75	57	15.1	19.8	10.0	9.7	7.4	12.1	3.7	Considerably worn.
Do	183587	...do	80	55	15.2	20.4	10.3	9.9	7.8	11.9	3.7	Do.
Do	183569	Female	83	55	16.0	20.4	10.3	9.8	8.3	12.9	3.8	Do.
Do	183575	...do	78	58	15.2	19.9	10.3	9.9	7.8	11.8	3.8	Much worn.
Do	183576	...do	80	56	14.9	20.4	10.1	9.3	8.7	12.6	3.7	Do.
Do	183581	...do	70	52	14.5	19.7	9.7	9.3	8.0	11.8	3.8	Moderately worn.
Do	183584	...do	70	51	15.3	18.9	10.2	10.0	7.2	12.2	3.8	Considerably worn.
Naivasha	162416	Male	80	51	14.8	19.8	10.0	9.6	7.8	11.6	3.8	Moderately worn.
Do	162433	...do	83	62	15.9	20.8	10.9	10.1	8.5	12.9	3.9	Do.
Do	162434	...do	81	58	15.3	19.9	9.7	9.5	7.8	12.3	3.7	Do.
Do	162437	...do	84	61	16.6	21.8	10.7	10.0	8.1	12.8	4.0	Do.
Do	162442	...do	72	55	15.8	19.1	9.6	9.4	7.7	11.8	3.9	Little worn.
Do	162426	Female	80	60	15.3	19.7	10.3	9.8	8.2	12.4	3.8	Do.
Do	162441	...do	80	59	16.0	20.3	10.2	9.5	8.1	12.8	3.9	Moderately worn.
Aberdares	[1] 162885	Male	76	54	15.0	19.5	10.5	9.8	7.4	11.8	3.9	Do.
Do	162561	...do	75	55	15.8	....	9.6	9.7	7.3	12.2	3.8	Do.
Do	162562	...do	70	51	15.7	18.5	9.9	9.8	7.4	11.8	3.7	Little worn.
Do	162560	Female	75	53	15.8	20.1	10.1	9.8	7.8	12.2	3.9	Considerably worn.
Nyeri	163468	...do	82	60	15.2	20.5	10.7	10.3	8.4	12.7	3.7	Moderately worn.

Mount Kenia	163499	...do....	88	54	16.1	21.4	10.8	10.2	8.8	13.4	3.9	Do.
Burgunett River	183563	...do....	80	48	15.0	19.8	10.4	9.9	7.9	12.4	3.9	Much worn.
Isiola River	183564	Male....	78	55	14.9	20.8	10.8	9.8	8.8	12.6	3.7	Moderately worn.
M. f. murilla.												
Thika River	163453	...do....	81	40	14.0	....	10.8	10.1	8.5	12.7	3.7	Do.
Kamiti Farm	163451	Femalo .	70	48	14.7	20.0	10.2	9.8	7.7	12.2	3.8	Little worn.
Kapiti Plains	161767	Male....	72	56	15.2	20.2	10.5	9.8	8.2	12.3	3.8	Moderately worn.
Do.	161768	...do....	80	50	15.1	20.6	10.8	9.9	8.4	12.5	3.8	Do.
Do.	161769	...do....	75	49	15.0	20.4	10.8	10.1	8.2	12.6	3.8	Do.
Do.	161770	...do....	76	52	15.1	21.0	10.8	10.3	8.3	12.5	3.9	Do.
Do.	161771	...do....	74	57	15.2	20.8	11.0	10.3	8.3	13.0	3.8	Do.
M. emesi.												
Uganda:												
Hoima	165248	Female .	69	50	13.4	17.8	10.0	9.4	7.4	11.0	3.3	Little worn.
Kikandwa	165256	...do....	65	55	14.4	18.1	9.8	9.5	7.6	11.2	3.3	Do.
Kabula Muliro	[2] 164819	Male....	71	51	13.8	18.7	10.2	9.5	7.9	11.2	3.6	Moderately worn.
Kisimbiri	165250	...do....	65	48	14.4	17.8	10.0	9.6	7.4	11.0	3.3	Do.
Do.	165251	...do....	65	55	13.8	17.4	9.6	8.8	7.3	10.8	3.5	Do.
Do.	165253	...do....	....	....	13.8	17.7	9.4	8.9	7.3	10.6	3.3	Do.
Do.	165254	...do....	66	55	13.6	18.1	9.5	9.4	7.3	10.3	3.6	Do.
Do.	165252	Female .	58	49	13.8	17.4	9.4	9.0	7.3	10.9	3.3	Do.
M. b. enclavæ.												
Lado:												
Rhino Camp	[2] 164818	Male....	64	46	12.8	16.3	8.9	8.7	6.3	9.7	3.0	Do.
Do.	165084	...do....	50	49	12.8	15.1	8.5	8.3	6.2	9.2	3.2	Little worn.
Do.	165488	...do....	57	46	12.8	15.8	8.8	8.4	6.2	8.7	3.2	Do.
Do.	165489	...do....	65	46	13.2	16.7	8.8	8.7	6.4	9.5	3.0	Moderately worn.
Do.	165490	...do....	60	47	13.4	16.8	8.8	8.6	6.8	9.8	3.1	Do.
Do.	165491	...do....	59	48	12.7	16.0	8.3	8.1	6.7	9.4	2.9	Do.
Do.	165493	...do....	57	55	12.9	16.3	8.8	8.7	6.3	9.7	3.2	Do.
Do.	165494	...do....	52	50	12.5	16.2	8.6	8.3	6.9	9.6	3.0	Do.
Do.	165495	...do....	53	46	12.6	15.4	8.6	8.3	6.1	9.1	3.0	Do.
Do.	165487	Female .	62	42	13.3	16.2	8.6	8.5	6.6	9.4	3.0	Do.

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[1] Type of *Leggada naivashæ* Heller.

[2] Type.

Measurements of specimens of Mus—Continued.

Form and locality.	No.	Sex.	Head and body	Tail vertebræ.	Hind foot, dry, without claws.	Skull: Condylobasal length.	Zygomatic breadth.	Breadth of brain-case.	Length of nasals.	Length of mandible.	Upper tooth row.	Condition of molar teeth.
M. b. gondokoræ.												
Uganda: Gondokoro	[1] 164820	Male	60	43	12.3	16.1	9.0	8.5	6.3	9.2	3.0	Moderately worn.
M. b. bellus.												
B. E. A.												
Kapiti Plains	161776	do	54	45	12.3	16.8	9.1	8.5	7.1	10.3	3.3	Much worn.
Do	161778	Female	54	49	12.7	16.8	9.1	8.4	6.8	10.0	3.5	Moderately worn.
Ulukenia Hills	163514	do	63	45	12.3	16.7	9.4	8.6	7.3	10.3	3.0	Do.
Fort Hall	163459	do	65	47	12.0	17.1	9.0	8.6	6.7	10.1	3.2	Do.
Juja Farm	161780	Male	59	....	....	17.0	9.4	8.9	7.3	10.3	3.1	Do.
Do	161782	do	73	41	12.2	16.8	9.1	8.6	6.7	10.0	3.3	Do.
Do	161781	Female	70	42	....	16.8	9.3	8.9	6.8	9.9	3.1	Do.
Mount Gargues	183550	Male	62	49	12.5	17.4	9.7	9.4	7.7	10.3	3.3	Considerably worn.
M. b. vicinus.												
Mount Mbololo	183555	do	55	42	11.5	....	....	....	....	9.8	3.1	Moderately worn.
Mount Sagalla	183556	Female	62	46	12.5	16.3	9.0	8.6	7.0	10.3	3.3	Do.
Mariakani	183557	Male	53	39	11.0	....	....	....	....	9.6	2.9	Do.
M. b. petilus.												
Naivasha	162403	do	59	44	12.8	16.0	8.7	8.0	6.8	9.8	3.0	Do.
So. Guaso Nyiro	[1] 162397	do	54	44	12.3	16.1	8.4	7.9	7.0	9.8	2.9	Much worn.
Do	162398	do	55	40	12.2	....	....	7.9	5.9	8.9	....	Moderately worn.
M. g. gratus.												
Uganda: Kampala	165247	Male	67	58	12.7	16.8	9.1	8.3	7.2	9.9	2.8	Do.

B. E. A.:												
Kaimosi	183533	...do....	60	55	13.8	16.9	8.8	8.3	7.2	10.1	3.1	Do.
Do.	183520	Female.	58	49	12.7	16.7	8.8	8.7	6.7	9.9	3.1	Considerabl yworn.
Do.	183526	...do....	60	59	12.9	16.8	9.4	8.8	7.2	10.0	3.2	Moderately worn.
Do.	183527	...do....	63	53	13.0	16.8	8.9	8.3	6.7	10.1	3.1	Do.
Do.	183534	...do....	63	53	13.6	16.8	9.0	8.7	6.8	10.2	3.3	Do.
Kisumu	183517	...do....	65	53	14.0	18.3	9.6	9.3	7.6	11.2	3.5	Do.
Nyangnori	183540	Male....	65	59	13.6	17.8	9.3	9.0	7.5	10.8	3.3	Do.
Do.	183541	...do....	65	55	13.4	17.2	8.9	8.6	7.2	9.7	3.1	Do.
Do.	183538	Female.	75	50	13.8	19.3	10.3	9.5	7.8	11.5	3.5	Much worn.
Do.	183539	...do....	70	53	13.9	18.8	10.0	9.5	8.3	11.0	3.4	Moderately worn.
Naivasha	162400	Male....	57	57	13.9	16.4	8.8	8.4	6.7	10.0	3.0	Do.
Do.	162401	...do....	68	53	13.9	17.1	9.2	8.9	6.9	10.3	3.1	Do.
Do.	162409	...do....	62	53	14.3	17.2	9.5	8.9	7.4	10.3	3.2	Do.
Do.	162399	Female.	62	54	12.7	16.8	8.8	8.6	7.1	10.3	3.4	Do.
Do.	162405	...do....	65	56	13.7	16.9	9.4	8.7	6.8	10.2	3.0	Do.
Nyeri	163477	Male....	63	55	13.3	16.2	8.8	8.6	6.3	9.5	3.1	Little worn.
Do.	163485	Female.	67	57	14.0	17.2	9.3	8.9	6.8	10.2	3.0	Do.
Kenia	[2] 163487	Male....	70	60	14.6	18.2	9.5	9.0	7.1	10.5	3.3	Considerably worn.
Wambugu	163465	Female.	64	51	13.5	16.4	9.2	8.5	6.5	9.5	3.1	Moderately worn.
M. g. soricoides.												
Mount Mbololo	183543	Male....	63	55	14.0	....	9.5	....	6.8	9.8	3.2	Do.
Do.	[1] 183544	...do....	60	59	14.5	17.5	9.2	8.8	7.1	10.2	3.3	Do.
Do.	183545	...do....	60	....	14.3	....	9.1	....	7.2	9.8	3.1	Do.
Mount Umengo	183546	Female.	60	56	13.4	16.8	9.2	8.8	6.7	9.8	3.0	Do.
M. t. acholi.												
Lado:												
Rhino Camp	[1] 164817	Male....	68	36	13.2	19.1	9.9	9.3	8.0	11.3	3.2	Much worn.
Do.	165239	...do....	64	34	12.8	18.1	9.2	8.7	7.4	10.9	3.7	Little worn.
Do.	165240	...do....	67	35	12.3	17.8	9.3	9.0	7.5	10.5	3.3	Do.
M. wamæ.												
B. E. A.: Kapiti Plains	[1] 161777	Female.	68	40	13.3	19.8	9.9	9.3	8.3	12.2	3.5	Much worn.

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[1] Type.

[2] Type of *Mus gratus sungaræ* Heller.

The alcoholic specimen listed by True[1] from Doctor Abbott's Kilimanjaro collection as *? Mus minimus* Peters can not now be found. Doctor True reported it in a poor state of preservation in 1892.

MUS BELLUS PETILUS (Hollister).

Plate 25.

1916. *Mus bellus petilus* HOLLISTER, Smithsonian Misc. Coll., vol. 66, No. 10, p. 3. October 26. (Southern Guaso Nyiro River, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Four, as follows:

BRITISH EAST AFRICA: Naivasha Station, 1 (Loring); Southern Guaso Nyiro River, 3 (Loring).

MUS GRATUS GRATUS (Thomas).

Plate 26.

1909. *L[eggada] grata* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 549. December. (Mubuku Valley, east Ruwenzori, Uganda; type in British Museum.)

1910. *Leggada grata* THOMAS AND WROUGHTON, Trans. Zool. Soc. London, vol. 19, p. 507. March.

1910. *Mus (Leggada) gratus* ROOSEVELT, African Game Trails, Amer. ed., pp. 473, 484 (Loring); London ed., pp. 485, 495 (Loring).

1910. *(Leggada) Mus gratus* ROOSEVELT, African Game Trails, Amer. ed., p. 477; London ed., p. 489.

1911. *Mus gratus sungaræ* HELLER, Smithsonian Misc. Coll. vol. 56, No. 17, p. 7. February 28. (West Kenia Forest Station, 7,500 feet, British East Africa; type in U. S. Nat. Mus.)

Specimens.—One hundred and twelve, from localities as follows:

UGANDA: Butiaba, 1 in alcohol (Loring); Kajuia, 1 (Loring); Kampala, 1 (Heller); Kisimbiri, 4, including 3 in alcohol (Loring).

BRITISH EAST AFRICA: Fort Hall, 1 in alcohol (Heller); Kaimosi, 34, including 16 in alcohol (Heller); Kakumega, 1 in alcohol (Heller); Kisumu, 4 (Heller); Londiana, 1 in alcohol (Heller); Lukosa River, 2 in alcohol (Heller); Meru, 2 in alcohol (Heller); Mount Kenia, west side, 14, including 4 in alcohol (Loring); Naivasha, 8 (Loring); Nyangnori, 4 (Heller); Nyeri, 20, including 11 in alcohol (Loring); Oljoro O Nyon River, 1 (Loring); Omboni River, 2 in alcohol (Mearns); Wambugu, 11, including 3 in alcohol (Loring, Mearns).

I can find no characters to warrant recognition of the form described from Mount Kenia by Heller as *Mus gratus sungaræ*.

A grass mouse, usually entirely away from bushes and trees. Usually taken in the runways of the larger species. Occasionally come into tents. Nocturnal. (Appendix B, p. 477.) Caught in traps set at random in the bushy thickets in the lowland, as well as in the open grassy spots on the rocky hillsides where they frequented the runways made by various species of *Mus*. A few were collected on Mount Kenia. (Appendix C, p. 484.)[2]

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[1] Proc. U. S. Nat. Mus., vol. 15, p. 462. 1892.

[2] Roosevelt, Heller, and Loring, African Game Trails. 1910.

MUS GRATUS SORICOIDES Heller.

Plate 26.

1914. *Mus gratus soricoides* HELLER, Smithsonian Misc. Coll., vol. 63, No. 7, p. 10. June 24. (Mount Mbololo, Taita Hills, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Four, as follows:

BRITISH EAST AFRICA: Mount Mbololo, 3 (Heller); Mount Umengo, 1 (Heller).

MUS TENELLUS ACHOLI Heller.

Plate 26.

1911. *Mus tenellus acholi* HELLER, Smithsonian Misc. Coll., vol. 56, No. 17, p. 6. February 28. (Rhino Camp, Lado; type in U. S. Nat. Mus.)

Specimens.—Three, as follows:

LADO: Rhino Camp (Loring).

MUS WAMÆ Heller.

Plate 26.

1910. *Mus* (*Leggada*) *sorellus* ROOSEVELT, African Game Trails, Amer. ed., p. 473; London ed., p. 485. (Not *Leggada sorella* Thomas, 1909.)

1911. *Mus wamæ* HELLER, Smithsonian Misc. Coll., vol. 56, No. 17, p. 5. February 28. (Kapiti Plains, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Two, as follows:

BRITISH EAST AFRICA: Kamiti Farm, Athi Plains, 1 in alcohol with skull removed (Loring); Kapiti Plains, 1 (Loring).

Two East African forms of mice belonging to the same group as do *acholi* and *wamæ* (a group characterized by the short tail; long snout; and peculiar, elongated palate) are not represented in our collections. These are *Mus sorella* (Thomas) [1] from near Mount Elgon, and *Mus tenellus suahelicus* (Thomas) [2] from Taveta.

MUS MUSCULUS GENTILIS Brants.

1827. *M*[*us*] *gentilis* BRANTS, Het Geslacht der Muizen, p. 126. (Egypt and Nubia.)

1905. *Mus musculus gentilis* SCHWANN, Novit. Zool., vol. 12, p. 4. January. (Specimen listed below from Kerma.)

Specimen.—One from—

SUDAN: Kerma (Rothschild).

Genus CRICETOMYS Waterhouse.

1840. *Cricetomys* WATERHOUSE, Proc. Zool. Soc. London, 1840, p. 2. (*C. gambianus.*)

The giant rats listed below are all closely related forms, and it may well be doubted if some of the characters used in separating them hold good when better series of the animals are available for study. The Mount Gargues form, *Cricetomys gambianus raineyi*, is a well marked subspecies; but *elgonis*, *kenyensis*, *enguvi*, and *osgoodi* are very much alike. They must all be recognized, however, on the basis of the present material.

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 548. 1909.

[2] Ann. and Mag. Nat. Hist., ser. 8, vol. 6, p. 312. 1910.

For measurements of specimens of *Cricetomys* see opposite page.

CRICETOMYS GAMBIANUS RAINEYI Heller.

Plate 27.

1912. *Cricetomys gambianus raineyi* Heller, Smithsonian Misc. Coll., vol. 59, No. 16, p. 15. July 5. (Mount Gargues, Mathews Range, 6,000 feet, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Four, from localities as follows:

British East Africa: Mount Gargues, 2 (Heller); Mount Lololokwi, 2 (Heller).

CRICETOMYS GAMBIANUS ELGONIS Thomas.

1910. *Cricetomys gambianus elgonis* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 198. February. (South face of Mount Elgon at 10,000 feet, British East Africa; type in British Museum.)

Specimens.—Three, from the following localities:

British East Africa: Kaimosi, 1 (Heller); Kakumega, 1 (Heller); Lukosa River, 1 (Heller).

There is much variation in the color of the belly in these three skins. One is buffy white below except for a small area on the chest; one is almost entirely grayish-drab below; and the third is about intermediate between the other two in the coloration of this part of the body. In all three the white part of the tail is much more extensive than the darker basal portion.

CRICETOMYS GAMBIANUS KENYENSIS Osgood.

1910. *Cricetomys gambianus kenyensis* Osgood, Field Mus. Zool., ser. vol. 10, No. 2, p. 9. February. (South side of Mount Kenia, British East Africa; type in Field Mus. Nat. Hist., Chicago.)

Specimens.—Two, from the following localities:

British East Africa: Kikuyu, 1 (Klein); Nairobi, 1 (Klein).

The Nairobi skin has the underparts pure creamy white, sharply marked from the color of the sides; the Kikuyu skin has the underparts entirely drab colored, very slightly lighter than the color of the upperparts, and without noticeable line of demarcation.

CRICETOMYS GAMBIANUS ENGUVI Heller.

Plate 28.

1912. *Cricetomys gambianus enguvi* Heller, Smithsonian Misc. Coll., vol. 59, No. 16. p. 16. July 5. (Mount Umengo, Taita Mountains, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Fourteen, from the following localities:

British East Africa: Macharra, Taita Mountains, 1 (Heller); Mount Mbololo, 5 (Heller); Mount Sagalla, 1 (Heller); Mount Umengo, 6 (Heller).

Measurements of specimens of Cricetomys from British East Africa.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Length of nasals.	Mandible.	Maxillary tooth row.	Condition of molar teeth.
C. g. raineyi.												
Mount Gargues	[1] 181804	Male	315	375	65	67.2	32.6	24.7	27.3	43.1	12.0	Moderately worn.
Do.	183131	Female	280	325	60	....	30.0	....	23.5	38.8	11.9	Do.
Do.	183133	do.	300	375	63	66.1	32.9	24.4	28.6	42.6	11.8	Do.
C. g. elgonis.												
Kakumega	183113	Male	....	....	....	69.5	32.4	24.7	28.1	43.7	12.8	Do.
Kaimosi	183114	do.	340	380	68	....	32.9	25.2	28.1	44.3	12.6	Do.
Lukosa River	183115	do.	295	360	65	63.3	31.5	24.0	26.6	40.3	12.4	Do.
C. g. kenyensis.												
Nairobi	183127	do.	....	....	....	64.2	....	25.8	....	41.7	11.6	Do.
Kikuyu	183128	do.	384	412	....	70.1	34.0	26.4	30.4	46.6	11.3	Do.
C. g. enguvi.												
Mount Umengo	182251	do.	370	390	70	74.5	35.5	25.3	31.8	48.7	11.9	Much worn.
Do.	[1] 181805	Female	325	383	69	70.8	33.9	24.3	30.3	47.1	12.0	Do.
Do.	182253	do.	320	360	67	69.5	35.4	24.6	29.4	45.7	12.4	Do.
Do.	183123	do.	320	....	67	69.9	34.2	23.7	30.0	45.5	12.0	Considerably worn.
Mount Mbololo	183116	do.	330	377	64	71.3	33.9	24.6	30.3	46.5	11.4	Do.
Do.	183120	do.	300	330	68	66.1	31.5	24.3	27.5	41.7	11.4	Moderately worn.
Do.	183121	do.	310	360	70	64.5	30.5	23.4	27.3	41.7	11.9	Do.
C. g. osgoodi.												
Mazeras	[1] 181806	Male	330	395	66	68.3	32.6	24.2	30.0	43.7	11.6	Do.
Do.	182276	Female	340	395	66	73.0	34.6	25.1	32.0	47.7	12.5	Do.
Do.	182277	do.	....	....	....	75.1	35.0	25.5	32.9	48.7	11.8	Considerably worn.
Do.	182278	do.	....	....	....	69.2	32.7	24.3	30.0	45.2	12.0	Moderately worn.
Do.	182282	do.	....	....	....	71.3	31.9	25.3	30.5	46.9	11.5	Do.

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[1] Type.

ZANZIBAR: "Zanzibar," 1 (purchased from Wilh. Schlüter).

The Zanzibar specimen is without record other than the locality "Zanzibar" written on the label. This may be regarded as doubtful; the specimen may well have come from some mainland locality. It is much more like skins of the Taita Mountains form than like those of *osgoodi* from Mazeras, but has a much larger proportion of the tail whitish than in any specimen of either of these races in our collection.

In Heller's journal of the Rainey Expedition he notes that the giant rats were abundant in the Taita Hills; he often saw their holes and runways in the forests which clothe the summits. He found them gentle in the traps and they did not offer to bite when stroked. The natives use them extensively for food.

CRICETOMYS GAMBIANUS OSGOODI Heller.

Plate 29.

1912. *Cricetomys gambianus osgoodi* HELLER, Smithsonian Misc. Coll., vol. 59. No. 16, p. 16. July 5. (Mazeras, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Nine, as follows:

BRITISH EAST AFRICA: Mazeras (Heller).

The type-specimen of this subspecies is not, as stated in the original description, an aged individual. The skull is by no means fully grown and the molar teeth are only moderately worn.

Genus LOPHUROMYS Peters.

1866. *Lasiomys* PETERS, Mon.-ber. K. Preuss. Akad. Wiss., Berlin, 1866, p. 409. (*L. afer*. Not of Burmeister, 1854.)

1874. *Lophuromys* PETERS, Mon.-ber. K. Preuss. Akad. Wiss., Berlin, 1874, p. 234. (*L. afer*.)

The "harsh-furred" mice, as the members of this genus have been called, are among the most beautiful of all the African rodents. Their warm, rich coloration and general appearance suggest strongly certain members of the Neotropical genus *Oxymycteris*, and curiously enough the superficial appearance of skulls of the two genera presents many features in common. The number of forms, their exact relationship, and distribution, are still doubtful and the genus presents many problems for a careful monographer.

For tables of measurements of specimens see pages 107–109.

LOPHUROMYS AQUILUS AQUILUS (True).

Plate 30.

1892. *Mus aquilus* TRUE, Proc. U. S. Nat. Mus., vol. 15, p. 460. October 26. (Mount Kilimanjaro, German East Africa; type in U. S. Nat. Mus.)

1909. *Mus aquilus* LYON AND OSGOOD, Bull. 62, U. S. Nat. Mus., p. 144. January 28.

1909. *Lophuromys zena* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 550. December. (East side of Aberdare Mts., near Nyeri, British East Africa; type in British Museum.)

Measurements of specimens of Lophuromys.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry, without claws.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Mastoid breadth.	Mandible.	Upper tooth row, alveoli.	Condition of molar teeth.
L. a. aquilus.												
G. E. A.: Mount Kilimanjaro	[1] 18997	Male	....	....	21.4	....	14.6	6.2	....	17.4	4.8	Moderately worn.
B. E. A.:												
Engare Narok	162547	...do	142	82	21.2	29.8	14.8	6.1	12.9	18.3	4.9	Do.
Lake Naivasha	162551	...do	134	71	21.7	30.9	15.5	6.1	12.9	18.9	5.3	Much worn.
Do	162553	...do	133	74	20.8	31.2	15.2	6.0	13.3	18.8	5.0	Do.
Do	162556	...do	137	74	21.8	30.8	15.4	5.9	13.1	19.1	5.4	Moderately worn.
Do	162560	...do	126	....	20.5	29.5	14.4	5.9	13.2	18.2	5.5	Do.
Do	162571	...do	147	78	21.7	29.2	14.4	5.7	13.0	18.7	5.2	Do.
Do	162554	Female	122	67	20.6	29.3	14.6	5.9	13.0	18.3	5.5	Do.
Do	162555	...do	135	....	21.0	29.8	15.3	6.3	13.2	18.7	5.8	Much worn.
Do	162557	...do	133	75	21.1	30.7	15.3	6.3	13.3	19.2	5.4	Do.
Do	162568	...do	137	69	20.3	29.6	14.3	6.3	13.0	18.4	5.5	Moderately worn.
Nyeri	163538	Male	132	71	21.5	28.8	14.3	6.1	12.3	17.7	5.0	Do.
Wambugu	163535	...do	119	69	22.3	30.6	14.9	6.7	13.6	18.8	5.3	Do.
Do	163591	Female	135	71	21.6	29.6	14.4	6.0	12.5	18.3	5.3	Do.
Aberdare Mountains	183882	Male	123	....	20.5	29.4	15.8	6.0	12.7	17.5	5.0	Considerably worn.
Do	183884	...do	125	87	21.3	28.7	14.4	6.0	12.5	17.4	5.3	Moderately worn.
Do	183889	...do	132	74	21.8	29.4	15.3	6.0	12.8	17.3	5.1	Do.
Do	183890	...do	120	68	21.5	....	14.1	5.9	12.7	17.2	5.3	Do.
Do	183894	...do	135	80	21.1	29.3	14.6	6.0	12.8	17.4	5.0	Do.
Do	183895	...do	125	77	22.0	29.2	14.7	6.1	12.7	16.8	5.1	Do.
Do	183886	Female	120	74	21.2	30.0	15.2	6.0	12.9	18.3	5.2	Do.
Do	183887	...do	140	72	20.6	30.7	15.3	5.8	13.1	18.7	5.2	Do.
Do	183888	...do	140	....	20.8	30.3	15.0	5.9	13.2	18.2	5.2	Do.

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[1] Type.

Measurements of specimens of Lophuromys—Continued.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry, without claws.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Mastoid breadth.	Mandible.	Upper tooth row, alveoli.	Condition of molar teeth.
Mount Kenia	163544	Male	142	....	22.3	29.4	15.6	6.4	13.6	18.8	5.0	Much worn.
Do	163555	...do	129	69	22.2	29.2	13.4	6.0	12.6	18.6	5.2	Do.
Do	163568	...do	126	....	21.7	28.6	13.8	6.1	13.2	18.2	5.1	Moderately worn.
Do	163570	...do	124	....	22.0	29.0	13.8	5.9	12.8	16.8	5.2	Do.
Do	163574	...do	132	....	21.8	28.9	14.3	6.0	....	18.3	4.8	Much worn.
Do	163575	...do	122	70	21.7	29.9	14.1	5.9	12.9	17.1	5.3	Moderately worn.
Do	163576	...do	124	55	21.0	28.6	14.4	6.0	12.7	18.1	4.8	Do.
Do	163515	Female	133	65	21.0	28.3	14.9	5.9	12.6	17.5	5.0	Do.
Do	163527	...do	130	....	21.1	30.0	14.6	6.2	13.5	18.8	5.5	Much worn.
Do	163559	...do	116	57	20.7	28.2	14.0	5.8	12.8	17.5	4.8	Moderately worn.
Do	163560	...do	122	62	21.1	28.6	13.9	6.0	13.0	17.9	4.9	Do.
Nzoia River	163518	Male	135	79	20.7	30.4	15.4	6.3	13.3	18.7	4.9	Much worn.
Lukosa River	183877	...do	136	78	21.9	31.1	14.8	6.7	13.0	18.9	5.6	Do.
Kisumu	183865	...do	125	73	21.5	29.1	14.6	6.0	12.6	17.8	5.1	Moderately worn.
Do	183866	...do	126	64	20.2	28.9	14.9	6.2	12.6	17.0	5.0	Do.
Kaimosi	183867	...do	125	74	21.3	29.1	14.5	5.8	12.6	17.2	5.2	Do.
Do	183868	Female	135	80	20.0	30.5	14.9	6.2	12.8	18.9	5.1	Considerably worn.
Do	183870	...do	132	73	21.0	29.8	15.1	6.3	12.9	18.2	4.8	Do.
Do	183871	...do	123	68	20.7	30.4	15.5	6.2	13.2	18.2	5.5	Do.
Do	183873	...do	135	81	21.7	30.2	14.8	6.1	12.6	18.3	5.0	Moderately worn.
Do	183875	...do	115	73	20.8	28.8	14.5	6.0	12.4	17.4	5.2	Do.
Uganda:												
Kampala	165225	Female	130	66	19.5	....	14.2	5.9	12.6	16.8	4.8	Do.
Nkyanuma	165222	Male	122	76	20.8	28.9	14.8	6.0	12.8	17.3	5.0	Do.
Kisingo	165223	...do	124	50	20.0	27.7	14.1	5.9	12.6	17.2	5.0	Do.
Kikanda	165224	Female	124	73	20.5	28.9	14.1	6.0	12.3	17.4	4.3	Do.

L. a. margaritæ.												
B. E. A.:												
Mount Gargues	[1] 181793	Male	120	80	21.0	29.1	14.5	5.9	12.5	17.3	5.0	Considerably worn.
Do	183844	...do	120	68	19.7	27.4	14.1	5.7	12.2	16.8	5.1	Moderately worn.
Do	183849	...do	115	74	20.6	28.7	15.0	5.9	12.1	17.0	4.9	Considerably worn.
Do	183856	...do	120	77	21.8	29.0	14.8	6.2	12.4	17.8	5.0	Moderately worn.
Do	183860	...do	118	75	21.5	28.3	14.4	6.0	12.2	17.4	5.0	Do.
Do	183861	...do	120	70	21.0	28.8	14.4	5.9	12.3	16.9	5.0	Do.
Do	183847	Female	120	75	20.7	28.3	14.0	6.0	12.0	16.5	4.9	Do.
Do	183850	...do	110	67	20.0	27.9	13.9	5.8	11.8	16.7	5.0	Do.
Do	183851	...do	120	75	20.5	28.4	14.2	5.9	12.1	17.1	4.9	Do.
L. a. ansorgei.												
B. E. A.:												
Kisumu	183896	Male	130	70	20.2	29.9	14.7	6.6	12.4	18.2	5.5	Do.
Do	183902	...do	130	66	22.3	29.9	15.3	6.2	13.7	18.3	5.2	Do.
Do	183898	Female	125	81	22.2	30.3	15.3	6.4	13.3	18.3	5.0	Do.
Do	183899	...do	130	....	22.5	31.7	15.7	6.3	13.3	19.0	5.4	Do.
Do	183900	...do	132	....	20.2	31.4	15.8	6.3	13.1	18.9	5.5	Considerably worn.
Do	183901	...do	125	71	22.1	30.3	15.4	6.1	12.8	18.6	5.4	Moderately worn.
Do	183906	...do	125	71	22.1	30.2	15.1	6.4	12.6	18.8	5.3	Do.
Kaimosi	183910	...do	120	65	20.9	29.8	14.4	5.7	12.5	18.7	5.2	Little worn.
Nzoia River	163519	Male	150	74	22.6	31.5	15.4	6.7	13.4	19.7	5.4	Moderately worn.
Do	163517	Female	160	....	23.9	33.0	16.8	7.1	13.8	21.2	5.9	Much worn.
Uganda:												
Kabula Muliro	165213	Male	154	73	22.3	32.3	16.2	7.0	13.6	20.6	5.8	Moderately worn.
Hoima	165215	...do	138	....	22.9	31.1	15.9	6.9	13.4	19.8	5.4	Do.
Mnyouri Jardin	165211	...do	141	78	22.8	32.4	15.8	6.6	13.2	19.8	5.4	Do.
L. a. pyrrhus.												
Lado:												
Rhino Camp	[1] 164823	...do	136	72	21.9	30.9	14.8	6.7	12.7	18.8	5.2	Do.
Do	165209	...do	137	70	21.8	....	....	6.7	....	19.2	5.3	Do.
Do	165210	...do	138	65	23.8	30.5	15.2	6.5	13.0	18.7	5.5	Do.
Do	165207	Female	118	64	21.8	28.2	14.3	6.3	12.2	17.7	5.4	Little worn.
Do	165208	...do	129	67	22.7	30.3	15.1	6.5	13.2	18.8	5.2	Moderately worn.

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[1] Type.

1909. *Lophuromys rubecula* Dollman, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 551. December. (Elgonyi, Mt. Elgon, British East Africa; type in British Museum.)

1910. *Lophuromys aquilus* Roosevelt, African Game Trails, Amer. ed., pp. 472, 477; London ed., pp. 484, 489.

1914. *Lophuromys* sp. Cockerell, Miller, and Printz, Zool. Anz., vol. 44, p. 437. June 23.

Specimens.—Two hundred and fifty-three, from the following localities:

Uganda: Kampala, 6, including 4 in alcohol (Loring); Kikanda, 1 (Loring); Kisingo, 1 (Loring); Nkyanuna, 1 (Loring).

British East Africa: Aberdare Mountains, 23, including 5 in alcohol (Heller); Engare Narok River, 5 (Loring, Heller); Fort Hall, 1 (Loring); Guas Ngishu Plateau, north of Ravine Station, 3 in alcohol (Heller); Kaimosi, 29, including 18 in alcohol (Heller); Kakumega, 1 in alcohol (Heller); Kisumu, 3 (Heller); Lukosa River, 2 (Heller); Mount Kenia, west side, 100, including 26 in alcohol (Loring, Heller, Mearns); Naivasha 52, including 3 in alcohol (Loring, Mearns); Nyeri, 7, including 3 in alcohol (Loring); Nzoia River, 4, including 3 in alcohol (Heller); Oljoro O Nyon River, 2 (Heller); Ravine, 1 in alcohol (Heller); Sirgoit Lake, 3 in alcohol (Heller); Southern Guaso Nyiro River, 2 in alcohol (Mearns); Wambugu, 5, including 1 in alcohol (Loring, Mearns).

German East Africa: Mount Kilimanjaro, 1 (Abbott).

There appear to be no constant characters by which this form may be further divided into geographical races. A suitable series of specimens from the type locality of *aquilus* is still lacking, and until this is obtained it will be impossible to determine with certainty the status of Dollman's *Lophuromys zena.* Every feature of the type-specimen of *aquilus* can be matched in some specimen from British East Africa, however, and these latter do not vary geographically among themselves to any appreciable extent. Allowing for slight variations in tail and body measurements by different collectors and the usual differences of pelage due to wear and fading the species seems remarkably constant in both external and cranial characters from Kilimanjaro to Albert Nyanza. There is some difference in the size of the teeth in various specimens, but aside from what appears to be a slight reduction with altitude it amounts to little. I can not see the slightest difference between specimens from the type locality of *zena* and those from the Guas Ngishu Plateau, Kavirondo and Uganda, which should represent Dollman's *Lophuromys rubecula.* At first sight the Kaimosi and Lukosa River skins appear darker than usual, but as a matter of fact fresh, clean skins from Kenia and Naivasha match them almost precisely. The color of the hind foot varies greatly in the relative amount of dark and light area, but dark feet and light mottled feet are not confined to any one region. The same may be said of the intensity of color of the belly.

Breeding records noted on specimen labels are as follows: Nyeri, September 16, two large embryos; Aberdare Mountains, October 9, one and two large embryos.

Common in Rift Valley, on the top of the Aberdares, and in the Kenia forest. Go up to timber line, but are not found in the deep forest, save about the edges of the streams. Very fond of brush. Do not go out on the grassy plains. Usually. but not strictly, nocturnal; and in the cold, foggy uplands, as on the Aberdares, become diurnal.[1]

LOPHUROMYS AQUILUS MARGARETTÆ Heller.

Plate 30.

1912. *Lophuromys aquilus margarettæ* Heller, Smithsonian Misc. Coll., vol. 59, No. 16, p. 7. July 5. (Mount Gargues, Mathews Range, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Twenty-seven, including 6 in alcohol, as follows:

British East Africa: Mount Gargues (Heller).

This well marked form is chiefly conspicuous for its dark coloration and the absence of speckling on the lower back and rump. The skulls average smaller then in true *aquilus* and the tail is relatively longer.

See measurements, page 109.

LOPHUROMYS ANSORGEI ANSORGEI de Winton.

1896. *Lophuromys ansorgei* de Winton, Proc. Zool. Soc. London, 1896, p. 607. (Mumia's, Kavirondo, British East Africa; type in British Museum.)

1910. *Lophuromys ansorgei* Roosevelt, African Game Trails, Amer. ed., p. 472; London ed., p. 484.

Specimens.—Thirty, from localities as follows:

Uganda: Butiaba, 3, including 2 in alcohol (Loring); Hoima, 3, including 2 in alcohol (Loring); Kabula Muliro, 1 (Loring); Kikonda, 1 in alcohol (Loring); Kisingo, 1 odd skull (Loring); Lialo, 1 (Loring); Mnyouri Jardin, 1 (Loring).

British East Africa: Kaimosi, 1 (Heller); Kibabe, Kisumu, 3 in alcohol (Heller); Kisumu, 13 (Heller); Nzoia River, Guas Ngishu Plateau, 2 (Heller).

There is considerable difference in color between the series from Kisumu and Kaimosi, and those from other localities. Just what this means it is impossible to decide without more material. The Kisumu skins are very much like the colored plate of the type specimen of *ansorgei,* while those from a point on the Nzoia River equally near the type locality are considerably lighter in color, with reddish sides and a deeper colored belly. All of the Uganda skins are much like the Nzoia River specimens in color, and differ from the figure of the type and from the Kisumu skins by their lighter colored flanks. There appear to be some slight skull differences between the Kisumu specimens and the Uganda and Nzoia River material; but there are hardly enough specimens to be sure that these are really constant. I am almost sure that two well-marked subspecies are here represented—the Uganda and Guas Ngishu form, and the dark Kavirondo Gulf race. The type of *ansorgei* is doubtless somewhat intermediate but nearest the Kavirondo form.

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[1] Roosevelt and Heller, Afr. Game Trails, Appendix B, Amer. ed., p. 477. 1910.

LOPHUROMYS ANSORGEI PYRRHUS Heller.

Plate 30.

1911. *Lophuromys pyrrhus* Heller, Smithsonian Misc. Coll., vol. 56. No. 17, p. 10. February 28. (Rhino Camp, Lado Enclave; type in U. S. Nat. Mus.)

Specimens.—Nine, including 3 in alcohol and 1 odd skull, as follows:

Lado: Rhino Camp (Loring).

This form is closely related to true *ansorgei* but averages brighter and richer colored, with much more intensely colored underparts. The skulls appear to average smaller, but there is not a really old specimen in the series, so the limits of its growth are unknown. This race seems to be restricted to the western side of the Nile.

Genus URANOMYS Dollman.

1909. *Uranomys* Dollman, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 551. December. (*U. ruddi.*)

The single specimen of this genus collected by the Smithsonian African expedition has been made the type of a new species.

URANOMYS UGANDÆ Heller.

Plate 31.

1911. *Uranomys ugandæ* Heller, Smithsonian Misc. Coll., vol. 56. No. 17. p. 12. February 28. (Kikonda, Uganda; type in U. S. Nat. Mus.)

Specimen.—One, the type.

Uganda: Kikonda (Loring).

Genus BEAMYS Thomas.

1909. *Beamys* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 107. August. (*B. hindei.*)

This rare pouched rat is known only from the coast region of British East Africa, inland to Kilimanjaro; and from Nyasaland.

BEAMYS HINDEI Thomas.

1909. *Beamys hindei* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 108. August. (Taveta, British East Africa; type in British Museum.)

Specimens.—Thirteen, including one in alcohol, as follows:

British East Africa: Mazeras (Heller).

Heller found the cheek pouches of some of these specimens well filled with seeds.

For measurements of specimens see opposite page.

Measurements of specimens of Beamys hindei from Mazeras, B. E. A.

No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Ear.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Interorbital breadth.	Mandible.	Upper tooth row, alveoli.	Condition of molar teeth.
183101	Male	130	117	22.0	21	31.8	15.5	12.2	5.2	20.1	5.1	Moderately worn.
183104	do	125	114	21.0	20	32.1	15.0	12.4	4.9	21.0	5.0	Do.
183105	do	140	135	21.5	24	35.2	17.6	12.9	4.9	22.6	5.3	Do.
183106	do	126	118	21.5	22	31.2	15.6	12.4	5.2	19.7	5.2	Do.
183107	do	125	125	21.0	21	31.9	15.5	12.1	4.8	20.4	5.0	Do.
183109	do	140	128	23.0	22	34.2	17.2	13.3	5.1	20.5	5.2	Do.
183112	do	140	140	22.0	31	35.8	17.6	13.4	4.8	22.8	5.0	Do.
183102	Female	130	....	21.0	21	34.0	16.1	12.7	5.2	22.0	4.8	Much worn.
183103	do	125	124	20.5	22	32.1	15.9	12.4	4.9	20.0	5.3	Moderately worn.
183108	do	130	126	22.0	21	33.6	16.3	13.2	5.2	20.8	5.8	Do.
183110	do	140	129	21.0	21	35.0	16.8	12.8	5.0	22.0	5.3	Do.
183111	do	120	120	21.0	20	31.7	15.1	12.1	5.2	20.3	5.1	Do.

Genus SACCOSTOMUS Peters.

1846. *Saccostomus* Peters, Ber. Königlich Akad. Berlin, 1846, p. 258. (*S. campestris.*)

1903. *Eosaccomys* Palmer, Science, new. ser., vol. 17, p. 873. (*S. campestris.*)

The three species of pouched rats of the genus *Saccostomus* known from British East Africa are closely related to South African forms, and doubtless will prove to be geographical races of some earlier named species when the group is carefully monographed.

For measurements of specimens of *Saccostomus* see page 115.

SACCOSTOMUS MEARNSI Heller.

Plate 32.

1910. *Saccostomus mearnsi* Heller, Smithsonian Misc. Coll., vol. 54 [No. 1924], p. 3. February 28. (Changamwe, British East Africa; type in U. S. Nat. Mus.)

1910. *Saccostomus mearnsi* Roosevelt, African Game Trails, Amer. ed., p. 473; London ed., p. 485.

Specimens.—Two, as follows:

British East Africa: Changamwe (Mearns).

Doctor Mearns records the "iris very dark brown, almost black; toes flesh color."

SACCOSTOMUS UMBRIVENTER Miller.

Plate 32.

1910. *Saccostomus umbriventer* Miller, Smithsonian Misc. Coll., vol. 54 [No. 1925], p. 1. February 28. (Njoro Osolali, Sotik, British East Africa; type in U. S. Nat. Mus.)

1910. *Saccostomus umbriventer* Roosevelt, African Game Trails, Amer. ed., pp. 473, 479; London ed., pp. 485, 490.

Specimens.—Eight, from localities as follows:

British East Africa: Kabalolot Hill, Sotik, 1 (Heller); Njoro Osolali, 3 (Loring); Southern Guaso Nyiro River, 1 (Heller); Telek River, Sotik, 3 (Heller).

SACCOSTOMUS ISIOLÆ Heller.

Plate 31.

1912. *Saccostomus isiolæ* Heller, Smithsonian Misc. Coll., vol. 59, No. 16, p. 14. July 5. (Isiola River, Northern Guaso Nyiro, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Twenty-nine, from localities as follows:

British East Africa: Isiola River, 20 (Heller); Lower Nyuki, Northern Guaso Nyiro, 1 (Heller): Mayo River, Laikipia Plateau, 1 (Heller); Turah Water, Northern Guaso Nyiro, 7 (Heller).

One female contained four embryos, another six, on July 1.

Measurements of specimens of Saccostomus.

Form and locality.	No.	Sex.	Head and body	Tail vertibræ.	Hind foot, dry, without claws.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Length of nasals.	Mandible.	Upper tooth row, alveoli.	Condition of molar teeth.
S. mearnsi.												
B. E. A.:												
Changamwe	[1] 162882	Male	156	65	22.1	32.2	16.4	13.2	13.9	20.4	6.8	Moderately worn.
Do	164854	Female	137	73	22.0							
S. umbriventer.												
B. E. A.:												
Southern Guaso Nyiro	162610	Male	188	53	20.5	32.2	15.9	13.5	15.4	20.6	6.3	Considerably worn.
Njoro Osolali	162611	Female	133	60	20.8	32.9	17.0	14.2	16.3	21.3	6.0	Do.
Do	[1] 162612	...do	136	55	20.5		17.3	13.8	16.8	21.9	6.6	Much worn.
Kabalolot Hill	181732	...do	130	56	19.0	32.0	16.0	13.0	15.6	21.0	6.0	Considerably worn.
Telek River	181733	...do	140	54	20.4	32.9	16.9	14.0	15.8	21.7	6.8	Do.
S. isiolæ.												
B. E. A.:												
Isiola River	183689	Male	130	69	21.5	32.8	17.8	14.1	15.6	21.8	6.4	Moderately worn.
Do	183690	...do	132	78	22.3	34.4	17.9	14.3	15.6	21.8	6.8	Considerably worn.
Do	[1] 181803	Female	128	72	21.2	33.1	17.1	14.1	14.1	20.4	6.7	Moderately worn.
Do	183678	...do	130	67	21.2	32.7	17.0	13.7	14.8	21.2	6.8	Do.
Do	183679	...do	135	70	21.3	32.6	18.2	13.9	13.9	20.6	6.6	Do.
Do	183684	...do	135	66	20.4	31.6	17.0	13.8	14.0	20.7	6.3	Do.
Do	183688	...do	125	68	19.8	31.3	17.3	13.6	13.4	20.3	6.6	Do.
Mayo River	183705	...do	133	70	21.0	32.8	17.6	14.0	15.1	21.3	6.5	Do

[1] Type.

Genus ACOMYS Geoffroy.

1838. *Acomys* I. Geoffroy, Ann. Sci. Nat., Paris, ser. 2, vol. 10, p. 126. (*A. cahirinus.*)

The spiny mice of this genus appear to be very local in distribution and large parts of East Africa are unrepresented by specimens. In some favorable localities, as in the Northern Guaso Nyiro district, three, if not four, distinct species are found in one vicinity and the animals are abundant.

For detailed measurements of specimens see pages 119–121.

ACOMYS WITHERBYI de Winton.

1901. *Acomys witherbyi* de Winton, Novit. Zool., vol. 8, p. 400. December 31. (El Kowa, Sudan; type in British Museum.)

1905. *Acomys witherbyi* Schwann, Novit. Zool., vol. 12, p. 4. January.

Specimen.—One, as follows:

Sudan: Naikhala (Rothschild).

Dr. Glover M. Allen[1] has suggested the probable identity of this species with *Acomys cineraceus* Heuglin and Fitzinger, described from Doka, eastern Sennar, between the Atbara and the Rahad Rivers.

ACOMYS HYSTRELLA Heller.

Plate 31.

1911. *Acomys hystrella* Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 13. February 28. (Nimule, Uganda; type in U. S. Nat. Mus.)

Specimens.—Thirty-seven, from localities as follows:

Uganda: Ledgus, 5 in alcohol (Loring); Nimule, 32, including 9 in alcohol and 16 odd skulls (Loring).

ACOMYS IGNITUS IGNITUS Dollman.

1910. *Acomys ignitus* Dollman, Ann. and Mag. Nat. Hist., ser. 8, vol. 6, p. 229. August. (Voi, British East Africa; type in British Museum.)

Specimens.—Thirty-two, from the following localities:

British East Africa: Changamwe, 5, including 4 in alcohol (Mearns); Maji-ya-chumvi, 2 (Heller); Mariakani, 4, including 2 in alcohol (Heller); Mazeras, 9, including 4 in alcohol (Heller); Mtoto Andei, 6, including 3 in alcohol (Heller); Voi, 6 (Heller).

Doctor Mearns notes of an adult male from Changamwe: "Iris very dark brown." At Voi on October 28, Heller found females with one and two large embryos; at Mariakani, January 1, with one embryo; and at Mtoto Andei, April 6, one very large embryo which is preserved in alcohol.

ACOMYS IGNITUS KEMPI Dollman.

1911. *Acomys kempi* Dollman, Ann. and Mag. Nat. Hist., ser. 8, vol. 8, p. 125 July. (Chanler Falls, Northern Guaso Nyiro, British East Africa; type in British Museum.)

1914. *Acomys i*[*gnitus*] *kempi* Dollman, Ann. and Mag. Nat. Hist., ser. 8, vol. 14, p. 487. December.

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[1] Bull. Mus. Comp. Zool. Harvard, vol. 58, p. 329. July, 1914.

Specimens.—Fifty-two, from the following localities:

British East Africa: Archer's Post, 4, including 1 in alcohol and 2 odd skulls (Heller); Chanler Falls, 1 (Percival); Isiola River, 1 in alcohol (Heller); Kara River, Marsabit Road, 1 (Heller); Lakiundu River, 21, including 10 in alcohol and 3 odd skulls (Heller); Longaya Water, Marsabit Road, 2 (Heller); Marsabit Road, 1 in alcohol (Heller); Merele Water, Marsabit Road, 1 (Heller); Mount Gargues, 9, including 2 in alcohol (Heller); Northern Guaso Nyiro River, 6, including 2 in alcohol (Heller, Percival); Quoy, Marsabit Road, 1 (Heller); Salt River, 3 (Percival); Sandai, 1 (Percival).

Included in the above series are several specimens which have been identified by Dollman as belonging to his *Acomys pulchellus*,[1] described from the same type locality as *Acomys ignitus kempi*. The specimens are unquestionably the rather immature examples of *kempi*, and it seems probable that such a specimen was made the type of *pulchellus*. There is an extraordinary difference in size of skulls in this species between young adults and old adults. Skulls which have the teeth worn so that all pattern is obliterated still have the basal suture open, and the skull apparently grows throughout the life of the animal. It would seem strange that out of all the specimens of this group of *Acomys* from the Northern Guaso Nyiro in our collection all the oldest should be *kempi* and all the youngest specimens *pulchellus*. The series contains specimens showing all ages from those in which the last molar is not in place to very old individuals with the teeth almost worn away; and I am well satisfied that all belong to one species. The oldest specimens have heavier and longer spines than young or subadult animals. Mr. Heller examined the type-specimens of *kempi* and *pulchellus* in London and noted that the teeth were almost unworn in the type skull of *pulchellus*, while the type of *kempi* was old with much more worn teeth.

Two females from Marsabit Road, July 20 and 21, contained embryos; in one a single fetus, in the other, two fetuses.

ACOMYS IGNITUS MONTANUS Heller.

1914. *Acomys ignitus montanus* Heller, Smithsonian Misc. Coll., vol. 63, No. 7, p. 12. June 24. (North slope of Mount Marsabit, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Two, as follows:

British East Africa: Mount Marsabit (Percival).

The type was trapped at an altitude of 4,600 feet on the north slope; the paratype is from the south slope of the mountain. These specimens are without skulls, but the skins indicate a large, dark colored form related to *kempi*.

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 8, p. 127. July, 1911.

ACOMYS PERCIVALI Dollman.

1911. *Acomys percivali* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 8, p. 126. July. (Chanler Falls, Northern Guaso Nyiro, British East Africa; type in British Museum.)

Specimens.—Ninety-one, from the following localities:

BRITISH EAST AFRICA: Longaya Water, Marsabit Road, 2 in alcohol (Heller); Merele River, Marsabit Road, 38, including 13 in alcohol and 5 odd skulls (Heller); Mount Gargues, 23, including 11 in alcohol (Heller); Mount Lololokwi, 22, including 9 in alcohol (Heller); Northern Guaso Nyiro River, 6 (Heller).

Specimens were trapped on the summit of Mount Lololowki, at 6,000 feet. Breeding records are as follows: Northern Guaso Nyiro, October 4, two large embryos; Mount Gargues, September 3, two embryos; and a single embryo each from two females on Marsabit Road, July 28 and 30.

ACOMYS WILSONI WILSONI Thomas.

1892. *Acomys wilsoni* THOMAS, Ann. and Mag. Nat. Hist., ser. 6, vol. 10, p. 22. July. (Mombasa, British East Africa; type in British Museum.)

1910. *Acomys wilsoni* ROOSEVELT, African Game Trails, Amer. ed., p. 473. London ed., p. 485.

Specimens.—Eighteen, from localities as follows:

BRITISH EAST AFRICA: Changamwe, 1 in alcohol (Mearns); Mariakani, 1 in alcohol (Heller); Mazeras, 1 (Heller); Mount Sagalla, 2 (Heller); Mtoto Andei, 13, including 6 in alcohol (Heller).

ACOMYS WILSONI ABLUTUS Dollman.

1911. *Acomys ablutus* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 8, p. 127. July. (Nyama Nyango,[1] Northern Guaso Nyiro, British East Africa; type in British Mus.)

1914. *Acomys w[ilsoni] ablutus* DOLLMAN, Ann and Mag. Nat. Hist., ser. 8, vol. 14, p. 487. December.

Specimens.—Fourteen, from localities as follows:

BRITISH EAST AFRICA: Archer's Post, 4, including 3 in alcohol (Heller); Isioli River, 6, including 2 in alcohol and 1 odd skull (Heller); Northern Guaso Nyiro River, 4 in alcohol (Heller).

Heller found four embryos in a female collected at Archer's Post, July 5; and one embryo in a female captured near the Isiola River, July 1. Four embryos seem to be an unusually large number for mice of this genus.

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[1] According to Lönnberg, Kungl. Sv. Vet. Akad. Handl., vol. 48, No. 5, p. 96, 1912, this is another name for Neuman's camp, or "Neuman's Boma" of some maps, situated on the Northern Guaso Nyiro River near the mouth of the Isiola.

Measurements of East African specimens of Acomys.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry, without claws.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Interorbital breadth.	Mandible.	Upper tooth row, alveoli.	Condition of molar teeth.
A. hystrella.												
Uganda:												
Nimulo	165217	Male	106	82	15.6	25.4	13.5	11.1	4.6	15.8	4.5	Considerably worn.
Do	165218	...do	106	95	15.9	25.3	12.8	10.8	4.4	15.0	4.6	Moderately worn.
Do	165221	...do	104	92	15.5	25.3	12.8	11.0	4.6	15.1	4.5	Do.
Do	[1] 161521	Female	111	81	15.9	26.2	13.4	11.0	4.7	15.4	4.7	Much worn.
Do	165216	...do	109	73	15.9	25.6	13.4	11.0	4.4	16.0	4.8	Do.
Do	165219	...do	98	97	15.8	24.0	12.4	10.9	4.5	15.2	4.5	Moderately worn.
Do	165220	...do	106	97	15.7	23.8	12.6	10.8	4.5	14.4	4.4	Little worn.
A. i. ignitus.												
B. E. A.:												
Mtoto Andei	181750	...do	110	....	15.5	27.3	14.8	12.0	4.9	16.4	4.1	Much worn.
Voi	182885	Male	115	82	15.7	27.0	13.8	11.6	4.8	15.9	4.2	Do.
Do	182886	...do	105	87	15.6	26.2	13.9	11.6	4.5	15.4	4.2	Considerably worn.
Do	182887	...do	100	84	15.4	25.4	13.5	11.3	4.6	14.8	4.2	Do.
Do	182888	...do	80	72	15.5	22.9	12.4	10.8	4.4	13.9	4.2	Little worn.
Do	182889	Female	110	88	15.7	27.0	14.3	11.5	4.8	15.8	4.3	Considerably worn.
Do	182890	...do	110	90	15.4	26.8	13.8	11.6	4.8	15.6	4.3	Do.
Maji-ya-chumvi	182892	Male	106	76	15.9	27.3	13.6	11.5	4.7	16.0	4.4	Moderately worn.
Maseras	182895	Female	110	81	15.4	26.3	13.8	11.7	4.7	15.1	4.4	Do.
Do	182896	...do	112	74	16.1	27.3	13.9	12.2	5.0	16.4	4.3	Do.

[1] Type.

Measurements of East African specimens of Acomys—Continued.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry, without claws.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Interorbital breadth.	Mandible.	Upper tooth row, alveoli.	Condition of molar teeth.
A. i. kempi.												
B. E. A.:												
Northern Guaso Nyiro	183932	Male	100	94	15.8	25.7	13.6	11.4	4.6	15.2	4.3	Much worn.
Do	182931	Female	95	84	14.8	24.3	13.2	10.8	4.5	14.4	4.3	Considerably worn.
Lakiundu River	182910	Male	108	93	15.5	25.7	13.1	12.3	4.6	15.0	4.2	Do.
Do	182915	...do	100	88	14.8	24.8	13.0	11.0	4.8	14.2	4.4	Moderately worn.
Do	182916	...do	102	95	16.0	26.3	13.4	11.4	4.6	15.2	4.6	Considerably worn.
Do	182909	Female	110	94	15.6	26.3	13.3	11.5	4.6	15.7	4.3	Do.
Mount Gargues	182928	Male	95	82	15.8	25.8	13.4	11.2	4.9	15.3	4.4	Do.
Do	182929	...do	100	90	15.5	27.1	14.3	11.7	4.7	16.2	4.4	Much worn.
Marsabit Road	182918	...do	100	94	15.2	23.8	12.8	10.9	4.4	14.7	4.1	Little worn.
Do	182917	Female	100	100	15.0	24.5	12.4	10.6	4.5	14.0	4.2	Moderately worn.
A. i. montanus.												
B. E. A.:												
Mount Marsabit	182900	Male	91	97	16.0	....	....	....	....	....	....	
Do	[1] 182901	Female	90	92	15.6	....	....	....	....	....	....	
A. percivali.												
B. E. A.:												
Northern Guaso Nyiro	182979	Male	95	95	13.8	24.4	12.8	10.3	4.7	14.6	4.2	Much worn.
Mount Gargues	182955	...do	95	72	13.8	24.3	13.0	10.5	4.7	14.3	4.4	Moderately worn.
Do	182961	...do	92	82	14.1	24.4	13.3	10.9	4.9	14.6	4.8	Do.
Do	182964	...do	90	73	14.8	24.4	12.5	10.4	4.5	13.8	4.5	Do.
Do	182960	Female	97	91	15.0	25.3	13.3	11.2	4.8	15.3	4.2	Do.
Mount Lololokwi	182965	Male	100	88	14.5	25.2	13.5	10.7	4.9	15.8	4.5	Do.
Do	182970	...do	102	88	14.0	25.4	13.2	10.9	4.6	15.2	4.4	Considerably worn.
Do	182976	...do	87	....	13.5	26.5	14.0	10.9	4.9	16.0	4.6	Do.

Do.	182973	Female.	95	88	13.7	24.8	13.2	10.7	4.9	14.6	4.2	Do.
Marsabit Road	182944	Male.	90		13.2	24.3	12.8	10.3	4.5	14.1	4.1	Much worn.
Do.	182935	Female.	97	84	13.3	24.7	12.9	10.6	4.6	14.6	4.3	Do.
Do.	182945	...do.	98		13.0	24.1	13.0	10.5	4.8	14.4	4.1	Do.
A. w. wilsoni.												
B. E. A.:												
Mtoto Andei	181748	Male.	90	57	13.4	22.6	11.9	9.8	4.4	13.7	3.9	Moderately worn.
Do.	181749	...do.	90	55	12.6	22.4	12.0	9.9	4.5	13.5	4.0	Do.
Do.	181743	Female.	92	55	12.5	23.9	12.5	9.8	4.6	13.6	4.2	Considerably worn.
Do.	181746	...do.	85	46	12.3	22.1	11.7	9.9	4.4	13.3	3.9	Little worn.
Do.	181761	...do.	90	45	12.3	22.8	12.0	9.8	4.5	13.7	3.9	Considerably worn.
Mariakani	182986	Male.	85		12.8	23.5	12.2	9.8	4.4	13.9	3.7	Moderately worn.
Mount Sagalla	182984	...do.	90	50	12.6	23.2	12.3	10.1	4.4	13.8	4.0	Do.
Do.	182983	Female.	90	53	12.3	23.6	12.3	9.6	4.3	13.9	3.9	Do.
Mazeras	182985	Male.	85	51	13.3	24.1	11.8	9.9	4.3	14.3	3.9	Do.
A. w. ablutus.												
B. E. A.:												
Isiola River	182987	...do	83	40	12.0	21.4	11.4	10.1	4.3	13.2	3.7	Do.
Do.	182988	Female.	82	43	12.0	21.2	11.4	9.3	4.4	12.6	3.9	Do.
Do.	182989	...do.	80	43	11.8	21.5	11.5	9.5	4.2	12.8	3.9	Do.
Archer's Post	182990	...do.	95	46	11.5	22.4	11.3	9.7	4.1	12.8	3.8	Much worn.

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[1] Type.

Genus DASYMYS Peters.

1875. *Dasymys* PETERS, Mon.-ber. K. Preuss. Akad. Berlin, 1875, p. 12. (*D. gueinzii.*)

The swamp rats of the genus *Dasymys* are animals which do not seem to be common in collections. At least our collectors failed to take them in such satisfactory series as usual with many other murines. When collections are made throughout eastern and central Africa and it becomes possible to monograph the group in a satisfactory manner, most of the forms listed below will doubtless prove to be geographic races of *Dasymys incomtus* Sundevall.

For measurements of specimens see page 124.

DASYMYS HELUKUS HELUKUS Heller.

Plate 33.

1910. *Dasymys helukus* HELLER, Smithsonian Misc. Coll., vol. 54, [No. 1924], p. 2. February 28. (Sirgoit, Guas Ngishu Plateau, British East Africa; type in U. S. Nat. Mus.)

1910. *Dasymus helukus* ROOSEVELT, African Game Trails, Amer. ed., pp. 473, 478; London ed., pp. 485, 490. (Part.)

Specimens.—Fifty-five, from localities as follows:

BRITISH EAST AFRICA: Kaimosi, 50, including 9 in alcohol (Heller); Kibabe, Kisumu, 1 (Heller); Nzoia River, 1 (Heller); Sirgoit, 3, including 1 in alcohol (Heller).

The skins in this series are remarkably uniform in color. Heller notes three sucking young with a female collected at Kaimosi, January 29.

DASYMYS HELUKUS SAVANNUS Heller.

Plate 34.

1911. *Dasymys savannus* HELLER, Smithsonian Misc. Coll., vol. 56, No. 17, p. 14. February 28. (Fort Hall, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Fifteen, from the following localities:

BRITISH EAST AFRICA: Archer's Post, 1 (Heller); Fort Hall, 1 (Loring); Isiola River, 1 (Heller); Kapiti Plains, 1 (Loring); Lakiundu River, 3 (Heller); Mount Kenia, west slope, 8, including 6 in alcohol (Heller, Loring).

The material representing this pale reddish form is far from satisfactory. I suspect that more specimens will show the advisibility of separating a new subspecies from north of Mount Kenia. No specimen in the series matches the type in color or skull characters, but some of the skins from the Lakiundu River are the extremes of reddish coloration. The males in this small series are all of a grayish brown, much as in males and females of true *helukus*, while the females are all of the reddish type. The material is hardly extensive enough to prove that this is a regular sexual coloration. In other forms the sexes are indistinguishable in color.

DASYMYS HELUKUS NIGRIDIUS Hollister.

Plate 34.

1916. *Dasymys helukus nigridius* Hollister, Smithsonian Misc. Coll., vol. 66, No. 10, p. 2. October 26. (Lake Naivasha, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Twenty-six, as follows:

British East Africa: Aberdare Range, 1 (Heller); Lake Naivasha, 25, including 6 in alcohol and 3 odd skulls (Loring, Mearns).

This large, dark form is conspicuously different in coloration from its much paler geographical neighbors, *D. h. helukus* and *D. h. savannus*. The single specimen from the Aberdares, while slightly smaller than Naivasha skins, is fully as dark and is quite unlike the more reddish or brownish-gray specimens of *savannus* from the western slopes of Mount Kenia. It was collected at an altitude of 7,000 feet.

The skull of *Dasymys helukus nigridius* averages somewhat larger than skulls of either *Dasymys h. helukus* or *D. h. savannus*, with higher sinciput, heavier rostrum, and greater interorbital breadth. The teeth are also larger. Skins of young animals, about one-half grown, are especially dark as compared with the young of *D. h. savannus* of corresponding age. The subspecies is further conspicuous for its very long and silky fur.

Loring found three large embryos in a female collected at Naivasha Station, August 20.

DASYMYS ORTHOS Heller.

Plate 34.

1911. *Dasymys orthos* Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 13. February 28. (Butiaba, Albert Nyanza, Uganda; type in U. S. Nat. Mus.)

1914. *Dasymys* sp. Frick, Ann. Carnegie Mus., vol. 9, p. 8, pl. 1. June 6.

Specimens.—Three, from localities as follows:

Lado: Rhino Camp, 1 (Loring).

Uganda: Butiaba, 2 (Loring).

DASYMYS BENTLEYÆ MEDIUS Thomas.

1906. *Dasymys medius* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 18, p. 143. August. (Mubuku Valley, East Ruwenzori, Uganda; type in British Museum.)

1910. *Dasymys medius* Thomas and Wroughton, Trans. Zool. Soc. London, vol. 19, p. 514. March.

Specimen.—One, as follows:

Uganda: Mubuku Valley, East Ruwenzori (Dent).

Measurements of Specimens of Dasymys.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot from dry skin.	Skull: Condylobasal length.	Zygomatic breadth.	Length of nasals.	Interorbital breadth.	Upper tooth row (alveoli).	Lower tooth row (alveoli).	Condition of molars.
D. h. helukus.												
B. E. A.:												
Sirgoit	[1] 162889	Male	185	143	32	37.7	19.7	14.3	4.4	7.4	7.3	Moderately worn.
Do	164465	...do	160	131	30	34.7	18.5	13.1	4.4	7.6	7.5	Do.
Nzoia River	164464	...do	180	151	32	36.8	19.3	14.1	4.6	7.4	7.3	Do.
Kaimosi	183152	...do	165	155	30	36.4	18.7	13.4	4.1	7.4	7.3	Do.
Do	183159	...do	150	136	29	35.5	18.2	13.5	4.2	7.4	7.4	Do.
Do	183165	...do	150	152	31	36.2	18.8	13.1	4.7	7.6	7.5	Do.
Do	183173	...do	171	144	30	36.7	19.0	14.6	4.4	7.5	7.4	Considerably worn.
Do	183155	Female	145	150	30	35.6	19.1	14.3	4.5	7.2	7.0	Do.
Do	183158	...do	160	155	30	36.0	18.5	13.6	4.4	7.7	7.4	Do.
Do	183171	...do	145	154	28	36.1	18.9	13.6	4.5	7.4	7.4	Moderately worn.
D. h. savannus.												
B. E. A.:												
Fort Hall	[1] 164471	Female	156	146	30	37.5	18.5	14.6	4.4	7.5	7.3	Considerably worn.
Mt. Kenia	164463	Male	163	140	30	....	19.2	14.8	4.2	7.6	7.5	Do.
Archer's Post	183181	...do	162	145	31	37.9	18.9	14.6	4.5	7.5	7.3	Do.
Lakiundu River	183180	Female	150	152	30	35.4	18.5	13.2	4.5	7.4	7.2	Moderately worn.
Do	183179	...do	158	156	30	....	....	14.8	4.4	7.1	7.1	Considerably worn.
D. h. nigridius.												
B. E. A.:												
Naivasha	162449	Male	165	150	32	....	....	13.7	5.1	7.6	7.1	Moderately worn.
Do	162454	...do	....	....	....	36.7	18.7	12.0	4.8	7.9	7.5	Do.
Do	162455	...do	....	....	....	38.2	19.2	13.9	4.4	8.1	7.8	Do.
Do	162448	Female	164	164	33	38.4	20.0	14.5	5.0	8.2	7.6	Considerably worn.
Do	162452	...do	172	140	31	37.1	19.6	13.9	4.6	7.3	7.3	Do.
Do	162463	...do	....	....	....	37.9	20.4	14.6	4.8	7.9	8.0	Do.
Do	[1] 162465	...do	176	162	33	38.4	20.1	13.8	4.7	8.0	7.6	Moderately worn.

D. orthos.											
Uganda:											
Butiaba	[1] 164824	Male	160	156	32	36.3	18.3	14.0	4.4	7.3	7.3	Do.
Do.	165237	Female	138	145	31	35.2	18.2	13.4	4.3	7.4	7.3	Do.
Lado: Rhino Camp	165238	...do...	137	138	29	....	17.1	12.6	4.4	7.1	7.0	Do.
D. b. medius.												
Uganda: Ruwenzori	172920	Male	144	137	29	36.9	18.7	14.2	4.5	7.4	7.7	Considerably worn.

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[1] Type.

Genus PELOMYS Peters.

1852. *Pelomys* PETERS, Mon.-ber. K. Preuss. Akad. Berlin, p. 275. (*P. fallax.*)

The creek rat seems to be uncommon in most parts of British East Africa. No member of the restricted genus *Pelomys* was collected by the Smithsonian African Expedition, but while on the Rainey Expedition Mr. Heller found the following species abundant in the Taita Mountains.

PELOMYS FALLAX IRIDESCENS Heller.

Plate 35.

1912. *Pelomys fallax iridescens* HELLER, Smithsonian Misc. Coll., vol. 59, No. 16, p. 12. July 5. (Mount Mbololo, Taita Mountains, British East Africa, altitude 5,000 feet; type in U. S. Nat. Mus.)

Specimens.—Fifty-five, from localities as follows:

BRITISH EAST AFRICA: Mount Mbololo, 37, including 10 in alcohol (Heller); Mount Sagalla, 13, including 4 in alcohol (Heller); Mount Umengo, 2 (Heller); Voi, 3 (Heller).

There is great variation in color among skins of this form from a single locality. In some the iridescent greenish tint is very conspicuous over the entire upperparts. The opposite extreme from this condition is with almost no green in the make-up of the coloration above and with the subterminal rings of the longer hairs Sudan-brown rather than yellowish-buff, giving the animal a very different general appearance. There is a continouus growth of skull throughout life, and specimens with the teeth so much worn that all trace of the cusps is lacking still have the basi-sphenoid suture open.

For measurements of specimens see page 126.

Genus MYLOMYS Thomas.

1906. *Mylomys* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 18, p. 224. September. (*M. cuninghamei.*)

This poorly characterized genus perhaps should not be recognized as distinct from *Pelomys*, with which it is closely related.

Measurements of specimens of Pelomys and Mylomys.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot.	Ear.	Skull: Condylobasal length.	Zygomatic breadth.	Mandible.	Upper tooth row.	Lower tooth row.	Condition of molar teeth.
Pelomys f. iridescens.												
Mount Mbololo	[1] 181801	Male	140	140	32	18	33.3	18.2	21.7	7.0	6.9	Moderately worn.
Do	183648	do	140	145	32	18	32.3	17.3	20.9	7.1	6.8	Do.
Do	183653	do	140	154	32	18	33.3	18.1	20.5	7.0	6.9	Considerably worn.
Do	183658	do	150	180	32	18	34.0	18.3	21.3	7.1	6.7	Do.
Do	183663	do	160	......	32	20	35.7	18.5	21.6	7.2	6.7	Much worn.
Do	183641	Female	130	135	31	17	31.7	17.1	19.7	6.8	6.6	Moderately worn.
Do	183647	do	145	145	32	18	33.8	17.7	21.5	7.2	6.9	Much worn.
Do	183649	do	145	150	31	18	33.6	17.8	21.3	6.8	6.8	Do.
Do	183651	do	130	133	30	17	31.3	16.8	19.9	6.8	6.6	Moderately worn.
Do	183652	do	135	139	31	18	32.7	17.8	21.2	7.0	7.0	Considerably worn.
Do	183659	do	140	143	32	17	33.2	18.2	21.2	6.7	6.8	Do.
Do	183660	do	140	150	33	17	32.4	17.3	20.7	7.1	6.7	Moderately worn.
Do	183662	do	145	143	32	18	32.4	17.3	21.2	7.1	6.8	Considerably worn.
Mount Sagalla	183667	Male	150	164	33	18	33.9	18.0	21.3	7.2	7.0	Moderately worn.
Do	183671	do	135	156	32	19	33.2	17.6	20.8	6.9	6.7	Do.
Do	183674	do	155	165	32	19	35.1	18.6	22.3	7.4	7.0	Considerably worn.
Do	183668	Female	145	153	31	18	32.3	17.4	20.7	7.0	6.8	Moderately worn.
Do	183670	do	145	159	33	18	33.4	17.8	21.0	7.1	6.8	Do.
Do	183672	do	130	143	33	17	31.5	16.8	20.1	7.1	7.0	Little worn.
Do	183673	do	155	158	32	18	35.3	18.9	22.9	7.3	7.0	Much worn.
Mount Umongo	183665	Male	150	154	32	19	34.4	17.9	21.8	6.8	6.9	Moderately worn.
Do	183664	Female	140	146	32	18	33.4	17.5	20.9	7.3	6.9	Do.
Voi	183675	Male	145	158	33	20	35.1	18.4	21.3	7.2	6.8	Do.
Do	183677	do	160	158	33	20	36.4	18.7	22.8	7.0	7.0	Considerably worn.
Do	183676	Female	150	152	32	19	33.7	18.0	21.2	6.9	6.8	Moderately worn.

Mylomys roosevelti.

Nzoia River	[1] 162881	Male	170	153	33	19	34.1	18.2	21.2	8.3	7.8	Do.
Kaimosi	183598	do	158	175	34	19	33.3	17.3	20.0	7.9	7.8	Do.
Do	183603	do	155	161	32	18	33.3	17.0	21.3	8.1	8.0	Do.
Do	183607	do	162	168	33		34.9	17.4	22.1	7.8	7.8	Do.
Do	183600	Female	131	147	32	19	30.3	15.6	19.1	7.8	7.8	Little worn.
Do	183602	do	165	165	32	20	34.8	18.2	22.3	8.1	7.8	Much worn.
Do	183604	do	145	157	32	18	32.9	16.6	20.3	8.0	8.0	Moderately worn.
Do	183608	do	145	155	32	19	32.7	16.5	20.6	7.9	7.8	Do.
Kakumega	183613	Male	152	163	33	20	32.3	17.5	20.4	8.0	7.8	Do.
Do	182612	Female	155		30	19	32.7	17.3	21.7	7.5	7.2	Considerably worn.

MYLOMYS ROOSEVELTI (Heller).

Plate 33.

1910. *Pelomys roosevelti* HELLER, Smithsonian Misc. Coll., vol. 54 [No. 1924], p. 1. February 28. (Nzoia River, Guas Ngishu Plateau, British East Africa; type in U. S. Nat. Mus.)

1910. *Pelomys roosevelti* ROOSEVELT, African Game Trails, Amer. ed., pp. 473, 479; London ed., pp. 485, 490.

Specimens.—Eighteen, from the following localities:

BRITISH EAST AFRICA: Kaimosi, 15 (Heller); Kakumega, 2 (Heller); Nzoia River, Guas Ngishu Plateau, 1 (Heller).

Specimens from Kaimosi have slightly longer tails and darker colored feet than the type from Nzoia River, but the difference is not great and there is only the one specimen from the type locality. In the Kaimosi series are several very young specimens. The youngest, in which the last molars have not yet erupted, are colored above very much like the fully adult but are dark cinnamon buff below, the hairs with ground color dark gray, very different from the clear whitish belly of the adult. Older juveniles, after all the teeth are in place but quite unworn, are much duller above and are becoming more as in the older specimens below—the throat, breast, and posterior underparts are decidedly whitish. Slightly older specimens, with the teeth showing a little wear, are very much faded out, of a dull bleached brown above, but with the entire underparts in fresh coat like that of the adults.

For measurements of specimens see accompanying table.

Genus ARVICANTHIS Lesson.

1842. *Arvicanthis* LESSON, Nouv. Tabl. Mamm., p. 147. (*A. niloticus.*)

1843. *Isomys* SUNDEVALL, K. Svenska Akad. Handl., 1842, p. 219. (*A. niloticus.*)

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[1] Type.

The unstriped grass rats of the restricted[1] genus *Arvicanthis* are well represented in the collections from nearly all the districts of East Africa covered by our expeditions. The animals seem to be abundant everywhere and good series of specimens of most of the known forms were taken.

For measurements of specimens of *Arvicanthis* see pages 132–135.

ARVICANTHIS TESTICULARIS TESTICULARIS (Sundevall).

1843. *Isomys testicularis* Sundevall, K. Svenska Akad. Handl., 1842, p. 221. (Bahr el Abiad, Sudan.)

1905. *Arvicanthis testicularis* Schwann; Nov. Zool., vol. 12, p. 4.

Specimens.—Thirteen, from the following localities:

Sudan: Kerma, 1 (Rothschild); Khartoum, 10, including 3 in alcohol (Heller, Loring); Merowe, 1 (Rothschild); Shereik 1 (Rothschild).

ARVICANTHIS TESTICULARIS JEBELÆ Heller.

Plate 35.

1911. *Arvicanthis jebelæ* Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 9. February 28. (Rhino Camp, Lado Enclave; type in U. S. Nat. Mus.)

1911. *Arvicanthis testicularis jebelæ* Dollman, Ann. and Mag. Nat. Hist., ser. 8, vol. 8, p. 338. September.

Specimens.—Thirty-three, from localities as follows.:

Lado: Rhino Camp, 32, including 8 in alcohol (Loring, Mearns).

Uganda: Gondokoro, 1 (Loring).

The single specimen from Gondokoro is indistinguishable from the lighter colored skins in the series collected west of the Nile. At both Rhino Camp and Gondokoro distinct forms of the dark-bellied *Arvicanthis abyssinicus* group are also found. These latter are sharply separated by the Nile and it would therefore not be surprising if a better series from Gondokoro made it possible also to distinguish a form of *testicularis*, separate from the Lado subspecies, on the east side of the river.

ARVICANTHIS ABYSSINICUS CENTROSUS Hollister.

Plate 35.

1911. [*Arvicanthis*] *rubescens* Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 10. February 28. (Part, specimens from Rhino Camp, Lado; not of Wroughton.)

1916. *Arvicanthis abyssinicus centrosus* Hollister, Smithsonian Misc. Coll., vol. 66, No. 10, p. 1. October 26. (Rhino Camp, Lado; type in U. S. Nat. Mus.)

Specimens.—Sixteen, including two in alcohol, from:

Lado: Rhino Camp (Loring, Mearns).

This subspecies of *Arvicanthis abyssinicus* is readily distinguished from *Arvicanthis testicularis jebelæ* Heller, which occupies the same region in the Lado Enclave, by its much darker color, above and below, and by its shorter tail. In its blackish coloration it much resembles certain specimens of *A. abyssinicus nubilans* of the Kisumu Province, British East Africa, but its distribution is separated from the range of that form by the Uganda *A. a. rubescens,* which occupies the eastern side of the Nile system from Ankole to southern Sudan (Mongalla[1]).

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[1] See Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 18, pp. 67-70. July, 1916.

ARVICANTHIS ABYSSINICUS RUBESCENS Wroughton.

909. *Arvicanthis abyssinicus rubescens* WROUGHTON, Ann. and Mag. Nat. Hist. ser. 8, vol. 4, p. 538. December. (Kibero, Unyoro, Uganda; type in British Museum.)

1910. *Arvicanthis abyssinicus rubescens* ROOSEVELT, African Game Trails, Amer. ed., p. 473; London, ed., p. 485.

1911. [*Arvicanthis*] *rubescens* HELLER, Smithsonian Misc. Coll., vol. 56, No. 17, p. 10. February 28. (Part; specimens from Gondokoro, Uganda.)

Specimens.—Seventeen, from localities as follows:

UGANDA: Butiaba, 1 (Loring); Gondokoro, 9, including 1 in alcohol (Loring); Hoima, 1 (Loring); Kampala, 3 (Loring); Kisingo, 2 including 1 in alcohol (Loring); Nimule, 1 in alcohol (Heller).

There is considerable variation in color among the specimens representing this form, but on the average they are lighter and more reddish than any specimens of the neighboring subspecies in Lado and about Kavirondo Gulf. The Nile appears to be an effective barrier between this form and the much darker subspecies of Lado.

ARVICANTHIS ABYSSINICUS NUBILANS Wroughton.

1909. *Arvicanthis abyssinicus nubilans* WROUGHTON, Ann. and Mag. Nat. Hist., ser. 8, vol. 4. December. (Kisumu, British East Africa; type in British Museum.)

Specimens.—Forty-five, from the following localities:

BRITISH EAST AFRICA: Kaimosi, 23, including 5 in alcohol (Heller, Turner); Kakumega, 2 (Heller); Kisumu, 18, including 3 in alcohol (Heller, Turner); Nzoia River, 1 (Heller); Sirgoit Lake, 1 in alcohol (Heller).

This is a very slightly characterized form, averaging a little darker than *A. a. rubescens.* The amount of variation between specimens from Kisumu and Kaimosi is, however, almost as great as between the race as a whole and *rubescens,* and I much doubt if a conscientious reviser, working with suitable series of specimens, will recognize more than one form in the Nyanza region. I have been able to find only one character on which to justify the separation of the two subspecies, the slightly larger molar teeth of *nubilans.* This difference is pronounced when comparison is made between *rubescens* and specimens of *nubilans* from Kisumu, but much less so if specimens of the latter from Kaimosi are used.

Heller found five embryos in a female collected at Kaimosi January 23.

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[1] Recorded by Wroughton, Ann. and Mag. Nat. Hist., ser. 8, vol. 8, p. 461. October, 1911.

ARVICANTHIS ABYSSINICUS NAIROBÆ Allen.

1909. *Arvicanthis nairobæ* ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 26, p. 168, March 19. (Nairobi, British East Africa; type in Amer. Mus. Nat. Hist., New York.)

1909. *Arvicanthis abyssinicus nairobæ* WROUGHTON, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 537. December.

1910. *Arvicanthis abyssinicus nairobæ* ROOSEVELT, African Game Trails, Amer. ed., pp. 473 and 478; London ed., pp. 485 and 490.

Specimens.—Eighty-seven, from the following localities:

BRITISH EAST AFRICA: Engare Narok River, 7 (Loring); Fort Hall, 14, including 2 in alcohol (Loring, Mearns); Juja Farm, 44, including 3 in alcohol and 8 odd skulls (Loring, Mearns); Lake Naivasha, south end, 4 (Loring, Mearns); Nairobi, 1 (Mearns); Nyeri, 1 (Loring); Ulukenia Hills, 16, including 6 in alcohol (Loring).

Specimens collected near the south end of Lake Naivasha are practically indistinguishable from the Nairobi and Juja Farm skins. The range of *nairobæ* extends also west to the Engare Narok River, thus separating in this region the subspecies *præceps* and *pallescens*, on the north and south. Lönnberg[1] has recorded, on Dollman's identification of a specimen, *Arvicanthis abyssinicus præceps* from Fort Hall. Specimens in our excellent series from Fort Hall are in every way similar to *nairobæ* rather than to *præceps*, and the record of *præceps* from Fort Hall, based on a single specimen, is doubtless erroneous.

Loring found two females at Juja Farm, May 16, with six fetuses each. Mearns records from the same locality one female with six large fetuses, May 23, and one with three fetuses, May 24.

Roosevelt and Heller say of this species:[2]

> The commonest mouse in B. E. A. on the plains. Outnumbers any other species. Found everywhere in grass and brush, but not in deep forest. Often lives in shallow burrows round the bases of thorn-trees, from which its well-marked runways radiate into the grass. Strictly diurnal. Often seen running about in bright sunlight. Never found in traps at night.

ARVICANTHIS ABYSSINICUS PRÆCEPS Wroughton.

1909. *Arvicanthis abyssinicus præceps* WROUGHTON, Ann. and Mag. Nat. Hist., ser. 8, vol. 4, p. 538. December. (Naivasha, British East Africa; type in British Museum.)

Specimens.—Seven, from the following localities:

BRITISH EAST AFRICA: Mayo River, Laikipia, 3 (Heller); Naivasha Station, 4, including 1 in alcohol and 1 odd skull (Loring, Mearns).

ARVICANTHIS ABYSSINICUS PALLESCENS Dollman.

1914. *Arvicanthis rumruti pallescens* DOLLMAN, Abstract Proc. Zool. Soc. London, No. 131, p. 25. April 14. (Loita Plains, British East Africa; type in British Museum.)

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[1] Kungl. Svenska Vet. Akad. Handl., vol. 48, No. 5, p. 99. 1912.

[2] African Game Trails, Appendix B, p. 478. 1910.

Specimens.—Forty-seven, from localities as follows:

British East Africa: Loita Plains, 1 (Heller); Njoro Osolali, 1 (Loring); Sotik, 4 in alcohol (Heller); Southern Guaso Nyiro River, 41, including 21 in alcohol (Loring, Heller, Mearns).

Loring found one female with three fetuses, and two with five fetuses each, on the Southern Guaso Nyiro, June 15.

ARVICANTHIS ABYSSINICUS VIRESCENS Heller.

Plate 36.

1914. *Arvicanthis abyssinicus virescens* Heller, Smithsonian Misc. Coll., vol. 63, No. 7, p. 11. June 24. (Voi, British East Africa; type in U. S. Nat. Mus.)

Specimen.—One, the type:

British East Africa: Voi (Heller).

Dollman, in his synopsis of the forms of this group,[1] included specimens from Voi with *Arvicanthis abyssinicus neumanni* Matschie, described from Burunge, Irangi, south of Mount Kilimanjaro. Heller examined the type of *neumanni* in the Berlin Museum, before describing *virescens*, and made the following manuscript notes on it:

Type A 5593, ♂ young. Burungi, G. E. A., coll. O. Neumann; alcoholic; skull removed, but not cleaned. Head and body, 93; tail, 90; hind foot, 24; ear, 15. Immature, teeth not worn. Color buffy, without much annulation of darker color; underparts whitish; feet and tail buffy like sides. Skull: condyloincisive length, 26.5; basilar length, 22.5; zygomatic breadth, 15.0; nasals, 9.5 x 3.5; interorbital width, 4.8; upper tooth row, 5.4; diastema, 7.1.

ARVICANTHIS ABYSSINICUS CHANLERI Dollman.

1911. *Arvicanthis chanleri* Dollman, Ann. and Mag. Nat. Hist., ser. 8, vol. 8, p. 130. July. (Chanler Falls, Northern Guaso Nyiro, British East Africa; type in British Museum).

Specimens.—Thirty-one, from the following localities:

British East Africa: Engare Ndare River, Northern Guaso Nyiro, 1 (Heller); Mount Lololokwi, 29, including 1 in alcohol (Heller); North Loroghi Mountains, 1 (Percival).

This subspecies was trapped on Mount Lololokwi in the upper forest, near the summit, at 6000 feet altitude. It is clearly a subspecies of *abyssinicus*, and is rather closely related to *A. a. nairobæ*. Heller found a specimen of this animal in the stomach of a secretary-bird on Mount Lololokwi.

ARVICANTHIS SOMALICUS REPTANS Dollman.

1911. *Arvicanthis reptans* Dollman, Ann. and Mag. Nat. Hist., ser. 8, vol. 8, p. 129. July. (Nyama Nyango, Northern Guaso Nyiro, British East Africa; type in British Mus.)

1912. *Arvicanthis somalicus reptans* Lönnberg, Kungl. Svenska. Vet. Akad. Handl., vol. 48, No. 5, p. 99.

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 8, pp. 348–349. September, 1911.

Measurements of specimens of Arvicanthis.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Length of nasals.	Length of mandible.	Upper tooth row (alveoli).	Lower tooth row (alveoli).	Condition of molars.
A. t. testicularis.												
Sudan:												
Kerma	141506	Female	143	....	33.1	17.8	5.2	12.6	20.2	6.9	6.7	Moderately worn.
Khartoum	165114	Male	154	121	32.1	16.1	4.9	12.6	19.7	6.7	6.0	Do.
Do	165115	...do	162	145	33.6	16.9	5.3	13.1	21.3	6.5	6.4	Do.
Do	165116	...do	150	140	32.8	16.9	5.0	13.3	20.4	6.8	6.5	Do.
Do	165117	Female	160	148	32.8	17.0	5.8	12.5	20.3	6.9	6.4	Much worn.
Do	165118	...do	143	138	30.7	16.5	5.2	11.7	18.8	6.7	6.4	Moderately worn.
A. t. jebelæ.												
Lado:												
Rhino Camp	[1] 164826	Male	140	150	31.2	16.7	4.9	12.4	19.7	6.8	6.6	Do.
Do	164851	...do	132	132	30.3	15.8	5.0	11.3	19.6	6.9	6.8	Do.
Do	165120	...do	153	152	32.3	16.3	5.4	13.8	20.7	6.4	6.4	Do.
Do	165139	...do	135	136	33.1	17.6	5.5	14.1	20.6	6.4	6.3	Much worn.
Do	165123	Female	145	131	30.8	17.1	5.1	12.3	19.9	6.3	6.3	Considerably worn.
Do	165127	...do	152	142	31.3	16.9	5.1	11.6	20.7	6.7	6.7	Moderately worn.
Do	165128	...do	147	136	31.4	17.0	4.8	12.8	20.6	6.4	6.3	Do.
Do	165136	...do	122	133	29.8	16.5	4.6	11.5	19.5	6.4	6.3	Do.
Do	165137	...do	137	130	30.3	16.3	4.9	12.4	19.6	6.2	6.3	Little worn.
Do	165140	...do	146	140	31.2	17.0	5.4	12.7	20.3	6.8	6.8	Moderately worn.
Uganda: Gondokoro	165142	...do	127	135	30.0	16.7	5.0	11.8	19.8	6.4	6.2	Do.
A. a. centrosus.												
Lado:												
Rhino Camp	165162	Male	145	130	32.8	17.1	5.2	12.8	21.2	7.1	6.8	Do.
Do	165165	...do	153	128	33.8	18.0	5.5	13.6	21.7	7.1	6.8	Do.
Do	[1] 165167	...do	129	114	31.2	16.5	4.8	11.7	20.5	6.9	7.0	Do.

Do.	165170	...do.	144	131	33.3	17.8	5.3	13.2	21.3	6.8	6.8	Considerably worn.
Do.	165160	Female.	130	123	31.5	17.0	4.9	12.3	20.7	7.1	7.3	Little worn.
Do.	165161	...do.	137	120	32.2	17.5	5.2	12.2	21.3	6.8	6.8	Moderately worn.
Do.	165166	...do.	141	134	32.4	16.8	4.8	12.7	21.3	6.8	6.8	Little worn.
Do.	165168	...do.	149	135	32.7	17.4	5.0	13.2	21.1	7.1	7.0	Moderately worn.
Do.	165169	...do.	142	126	31.5	16.2	4.8	11.5	20.3	7.2	7.2	Do.
Do.	165171	...do.	129	113	31.3	16.5	5.1	11.7	20.2	6.8	6.5	Do.
A. a. rubescens.												
Uganda:												
Gondokoro	165150	Male.	146	124	31.2	16.3	4.6	12.4	19.6	6.8	6.3	Do.
Do.	165156	Female.	150	122	33.4	18.0	5.2	13.2	21.1	6.9	6.5	Much worn.
Do.	165157	...do.	131	119	30.1	16.1	5.1	11.1	19.7	6.7	6.4	Considerably worn.
Butiaba	165148	Male.	156	127	32.2	17.4	5.0	13.1	20.0	6.5	6.4	Moderately worn.
Hoima	165147	Female.	144	119	31.6	17.4	5.2	11.8	20.5	6.5	6.5	Do.
Kisingo	165149	Male.	151	123	32.6	17.2	5.6	12.6	20.0	6.5	6.1	Do.
Kampala	165144	Female.	150	117	31.1	17.3	4.7	11.5	20.2	6.5	6.3	Do.
A. a. nubilans.												
B. E. A.:												
Kaimosi	183036	Male.	155	118	34.5	18.2	5.0	13.0	22.2	6.8	6.5	Do.
Do.	183040	...do.	155	112	33.0	17.8	5.1	13.8	20.7	6.4	6.4	Do.
Do.	183043	...do.	155	110	34.1	18.3	5.2	13.2	21.6	6.9	6.5	Do.
Do.	183044	...do.	150	114	33.0	17.8	4.9	12.3	19.9	6.6	6.5	Do.
Do.	183038	Female.	140	115	31,8	16.5	4.6	12.2	20.3	6.9	6.5	Do.
Do.	183042	...do.	150	110	32.8	17.6	4.8	12.8	20.7	6.8	6.6	Do.
Do.	183047	...do.	150	109	32.2	17.7	5.0	12.7	21.6	6.5	6.8	Do.
Do.	183051	...do.	150	....	32.3	17.3	4.5	12.5	20.2	6.2	6.4	Considerably worn.
Kisumu	183025	Male.	145	....	32.1	17.6	4.8	12.3	20.5	7.0	6.8	Do.
Do.	183027	...do.	185	122	33.0	18.2	4.7	12.8	21.9	7.1	6.9	Do.
Do.	183030	...do.	150	....	33.4	18.2	5.4	13.4	21.7	7.1	6.7	Do.
Do.	183055	...do.	150	....	33.4	18.0	5.0	12.9	21.5	7.1	6.8	Moderately worn.
Do.	183031	Female.	135	112	32.4	17.9	4.9	12.3	21.3	7.2	6.6	Do.
Do.	183035	...do.	145	116	32.0	17.3	4.5	12.2	20.5	6.8	6.6	Do.
Do.	197969	...do.	....	....	33.4	17.9	4.9	13.0	21.8	7.1	7.0	Do.

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[1] Type.

Measurements of specimens of Arvicanthis—Continued.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Length of nasals.	Length of mandible.	Upper tooth row (alveoli).	Lower tooth row (alveoli).	Condition of molars.
A. a. nairobæ.												
B. E. A.:												
Nairobi	162746	Female	135	100	30.4	16.3	4.3	11.4	20.3	6.6	6.3	Little worn.
Ulukenia Hills	163607	Male	140	109	30.8	16.7	5.0	11.5	20.2	6.4	6.1	Much worn.
Do	163608	Female	133	108	29.7	16.8	4.7	12.1	19.8	6.1	5.7	Do.
Do	163614	...do	138	....	30.6	16.7	4.7	12.1	20.6	6.4	6.3	Do.
Juja Farm	161723	Male	123	116	29.9	16.6	4.8	11.5	19.7	6.4	6.3	Considerably worn.
Do	161735	...do	144	....	33.7	18.5	5.4	13.9	22.3	6.8	6.5	Much worn.
Do	161751	...do	138	114	31.1	16.6	5.0	12.4	20.1	6.2	6.3	Moderately worn.
Do	161736	Female	137	116	31.8	17.8	5.2	13.1	21.0	6.8	6.4	Do.
Do	161744	...do	141	128	31.1	16.7	5.2	12.0	20.0	6.4	6.3	Do.
Do	161746	...do	140	127	32.4	17.3	4.9	12.7	21.1	6.3	6.0	Do.
Do	161747	...do	134	110	30.9	16.8	4.8	12.3	19.8	6.8	6.4	Do.
Engare Narok River	162639	Male	131	119	30.8	16.0	4.5	11.8	20.2	5.8	5.8	Do.
Do	162640	Female	131	109	29.8	16.8	4.9	11.9	19.6	6.3	6.3	Much worn.
A. a. præceps.												
B. E. A.:												
Naivasha Station	162651	Male	168	119	33.8	18.2	4.8	13.2	21.6	6.9	6.7	Do.
Do	162652	Female	144	105	32.2	17.2	4.7	12.2	20.9	6.8	6.3	Do.
Laikipia	183021	Male	130	110	30.3	16.5	4.9	11.6	19.6	6.8	6.2	Moderately worn.
A. a. pallescens.												
B. E. A.:												
Southern Guaso Nyiro	162620	...do	138	100	31.0	17.6	5.2	12.7	19.2	6.3	6.2	Considerably worn.
Do	162622	...do	129	117	29.5	15.8	4.6	11.5	18.5	6.1	5.9	Little worn.
Do	162624	...do	142	107	29.8	16.8	4.9	12.1	18.7	6.3	6.3	Moderately worn.
Do	162629	...do	135	119	31.0	16.8	4.9	12.2	19.7	5.9	5.8	Little worn.
Do	162636	...do	136	112	30.1	16.0	4.7	11.8	18.9	5.9	5.8	Do.

Do.	162618	Female.	132	108	29.2	16.0	4.8	11.7	19.4	6.0	5.7	Moderately worn.
Do.	162625	...do.	122	106	28.2	15.8	4.6	11.3	18.4	6.2	6.1	Do.
Do.	162630	...do.	135	104	30.4	16.9	4.8	12.8	20.0	6.1	5.7	Considerably worn.
Do.	162631	...do.	137	110	30.2	16.5	4.7	12.2	19.5	6.2	6.1	Do.
A. a. virescens.												
B. E. A.: Voi	[1] 183922	Male.	125	108	30.4	16.6	4.8	11.9	20.0	6.8	5.9	Moderately worn.
A. a. chanleri.												
B. E. A.:												
Mount Lololokwi	182995	...do.	135	102	30.8	16.9	5.0	12.8	20.2	6.5	6.4	Much worn.
Do.	182996	...do.	120	105	29.8	16.5	4.9	12.0	19.5	6.4	6.3	Moderately worn.
Do.	182998	...do.	122	102	....	15.8	4.7	11.1	18.9	6.3	6.2	Do.
Do.	182999	...do.	126	....	31.1	16.8	5.3	12.9	20.5	6.6	6.3	Much worn.
Do.	183015	...do.	120	110	31.8	16.8	5.1	12.2	20.3	6.3	6.3	Considerably worn.
Do.	182991	Female.	110	90	27.6	15.7	4.8	11.2	18.0	6.8	6.3	Moderately worn.
Do.	182992	...do.	120	96	29.4	16.0	4.8	11.3	19.2	6.2	6.0	Considerably worn.
Do.	183000	...do.	120	102	28.0	15.5	4.4	10.8	18.5	6.4	6.4	Moderately worn.
Do.	183005	...do.	120	109	29.8	15.8	4.7	11.8	19.3	6.4	6.4	Do.
A. s. reptans.												
B. E. A.:												
Mount Lololokwi	183017	...do.	113	....	26.9	15.4	4.0	10.6	17.8	5.7	5.4	Do.
Lakiundu River	183068	Male.	125	124	28.6	15.8	4.5	11.1	17.9	6.0	5.7	Do.
Do.	183075	...do.	120	104	27.3	15.4	4.4	10.6	17.8	6.0	5.7	Do.
Do.	183077	...do.	124	116	28.3	16.8	4.5	12.2	18.3	5.9	5.5	Do.
Do.	183072	Female.	110	113	26.9	14.8	4.5	11.3	17.2	6.0	5.8	Do.
Do.	183076	...do.	110	108	26.1	14.9	4.2	10.9	17.0	6.1	5.9	Little worn.
Archer's Post	183083	Male.	122	108	28.0	16.0	4.7	11.1	17.9	5.9	5.7	Considerably worn.
Do.	183084	Female.	128	112	28.6	15.6	4.7	10.9	18.3	5.8	5.7	Moderately worn.
Isiola River	183065	Male.	112	93	26.5	14.8	4.4	10.8	17.4	5.4	5.2	Do.
Do.	183063	Female.	125	....	27.4	15.4	4.1	10.6	17.8	5.8	5.4	Do.
Lorian Swamp	183060	Male.	110	....	26.5	14.8	4.5	10.5	17.4	5.8	5.5	Do.
Do.	183061	...do.	106	108	26.4	14.4	4.4	10.3	17.8	5.7	5.4	Do.

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[1] Type.

Specimens.—Thirty-four, from localities as follows:

British East Africa: Archer's Post, 6, including 1 in alcohol (Heller); Isiola River, 7, including 2 in alcohol (Heller); Lakiundu River, 14, including 1 in alcohol (Heller); Lorian Swamp, 2 (Percival); Mount Lololokwi, 1 (Heller); Northern Guaso Nyiro River, 1 in alcohol (Cuninghame); Orr Valley, Mount Nyiro, 2 (Percival); South of Mount Nyiro, 1 (Percival).

This small species is found in the same localities with the much larger *Arvicanthis abyssinicus chanleri*, but the difference in the size of the skulls is so great that there should be no confusion in determining specimens.

Genus LEMNISCOMYS Trouessart.

1881. *Lemniscomys* Trouessart, Bull. Soc. Scient. Angers, vol. 10, pt. 2, p. 124. (*L. barbarus.*)

1912. *Lemniscomys* Heller, Smithsonian Misc. Coll., vol. 59. No. 16, pp. 11-12. July 5. (Part.)

1916. *Lemniscomys* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 18, pp. 68-69. July.

This genus of striped grass rats as recognized by Thomas includes those species of the old genus *Arvicanthis* which have the fifth finger much shortened, with a nail instead of a claw. The East African species belong to three distinct groups. The *griselda* (*dorsalis*) group includes forms distinctly marked by a single median dorsal stripe. The forms of the *striatus* (*pulchellus*) group are marked by numerous rows of light spots, frequently blended. In the last group, including subspecies of *barbarus*, there are numerous uninterrupted lines running lengthwise over the entire upperparts.

LEMNISCOMYS GRISELDA MACULOSUS (Osgood).

1910. *Arvicanthis dorsalis maculosus* Osgood, Field Mus. Zool. ser., vol. 10, No. 3, p. 17. April 7. (Voi, British East Africa; type in Field Mus. Nat. Hist., Chicago.)

1910. *Arvicanthis dorsalis maculosus* Roosevelt, African Game Trails, Amer. ed., p. 473; London, ed., p. 485.

1910. *Arvicanthis dorsalis phæotis* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 6, p. 429. October. (Mazeras, British East Africa; type in British Museum.)

Specimens.—Twenty-seven, from the following localities:

British East Africa: Changamwe, 15, including 8 in alcohol (Mearns); Maji-ya-chumvi, 2 (Heller); Mount Mbololo, 5 (Heller); Mount Sagalla, 3 (Heller); Mtoto Andei, 2 (Heller).

The differences given by Thomas in separating the Mazeras subspecies from *maculosus* prove to be too slight and too inconstant to warrant the recognition of a form from this region. The grayest specimens in our coast series are all rather young animals with the

Measurements of specimens of the Lemniscomys griselda group.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Length of nasals.	Length of mandible.	Upper tooth row, (alveoli).	Lower tooth row, (alveoli).	Condition of molars.
L. g. maculosus.												
B. E. A.:												
Mtoto Andei..........................	181735	Male....	140	140	....	....	5.1	13.3	19.3	6.4	6.1	Much worn.
Do..........................	181736	Female.	123	147	....	14.3	4.5	11.8	18.6	6.4	6.1	Moderately worn.
Mount Sagalla..........................	183092	Male....	130	135	30.4	15.6	5.0	12.4	19.0	6.3	5.9	Considerably worn.
Do..........................	183093	...do....	120	126	....	14.8	4.7	11.9	18.7	6.3	6.0	Do
Do..........................	183001	Female.	135	145	30.8	15.3	4.7	12.7	19.0	6.5	6.4	Do.
Mount Mbololo..........................	183087	Male....	125	139	31.1	15.6	4.6	11.5	19.7	6.3	6.3	Do.
Do..........................	183088	...do....	120	120	28.3	14.4	4.7	11.5	17.9	5.8	5.9	Moderat y worn.
Do..........................	183090	...do....	130	140	31.2	15.2	4.8	13.0	19.8	6.4	6.2	Considerably worn.
Do..........................	183086	Female.	120	133	30.3	15.2	4.7	12.7	19.2	6.3	6.0	Do.
Do..........................	183089	...do....	125	139	....	....	....	12.6	19.1	6.0	5.9	Do.
Maji-ya-chumvi..........................	183094	Male....	130	140	30.6	15.5	5.2	12.9	19.0	6.3	5.8	Little worn.
Do..........................	183095	...do....	130	138	30.5	15.4	4.4	13.3	19.4	6.3	5.9	Do.
Changamwe..........................	163620	...do....	122	140	....	....	....	....	....	....	....	
Do..........................	163618	Female.	122	140	....	....	....	....	....	....	....	
Do..........................	163621	...do....	132	148	....	....	....	....	....	....	....	
Do..........................	163622	...do....	133	137	....	....	....	....	....	....	....	
L. g. mearnsi.												
B. E. A.:												
Fort Hall..........................	163617	Male....	135	135	31.0	15.0	5.0	12.7	19.3	6.3	6.2	Moderately worn.
Do..........................	163625	...do....	127	133	....	14.6	5.0	11.5	18.7	5.9	5.8	Little worn.
Do..........................	[1] 163616	Female.	131	141	....	....	....	....	....	....	....	

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[1] Type; see remarks on page 138.

teeth little worn, and all of the specimens from Taita Hills are much older, with the teeth showing more wear. There are several specimens from Changamwe and from the Taita Hills which are virtually indistinguishable in color. The color of the ears is alike in both series.

For the use of the specific name *griselda* in place of *dorsalis*, see a paper in 1916 by Thomas.[1]

Measurements of specimens of the subspecies of *Lemniscomys griselda* are given on page 137.

LEMNISCOMYS GRISELDA MEARNSI Heller.

1914. *Lemniscomys dorsalis mearnsi* Heller, Smithsonian Misc. Coll., vol. 63, No. 7, p. 12. June 24. (Fort Hall, British East Africa; type in U. S. Nat. Mus.).

Specimens.—Three, as follows:

British East Africa: Fort Hall (Loring).

This is a well marked subspecies, distinguished from *L. g. maculosus* by its much richer color. The skull measurements given in the original description are very misleading as they were taken from a skull of the much larger *Arvicanthis abyssinicus nairobæ* (U. S. N. M., 163601, from Nyeri), mismatched with the skin of *dorsalis* from Fort Hall which was selected by Heller as the type-specimen of *mearnsi*. The original field label on the skull plainly corrects the obvious error, but the skull really belonging with the type skin can not be found. Measurements of the skulls of two male topotypes are given in the table on page 137.

LEMNISCOMYS MACCULUS MACCULUS (Thomas and Wroughton).

1910. *Arvicanthis macculus* Thomas and Wroughton, Trans. Zool. Soc. Lond., vol. 19, p. 515. March. (Mokia, S. E. Ruwenzori, Uganda; type in British Museum.)

Specimens.—Ten, from the following localities:

Lado: Rhino Camp, 2 (Loring).

Uganda: Gondokoro, 1 (Loring); Kabula Muliro, 2, including 1 in alcohol (Loring); Kisingo, 2 (Loring); Nimule, 1 in alcohol (Heller).

British East Africa: Nzoia River, Guas Ngishu Plateau, 2, including 1 in alcohol (Heller).

This species, which apparently differs from *Lemniscomys striatus massaicus* only in its smaller size, has a wide distribution in the northern Victoria Nyanza region; but although there are large series of *Lemniscomys* in the collection from British East Africa, no specimens of *macculus* appear from east of the Nzoia River, Guas Ngishu Plateau. It would therefore seem that *macculus* is essentially a species of central Africa. Throughout its range it is found associated with *massaicus*, and as the two species are of exactly the same color, each exhibiting the same wide variations in this character, it is readily separated only by the small size of the hind foot and by the smaller skull. My first idea was to consider these small specimens merely dwarfs of the larger species, *massaicus*, but from the fact that no specimens exactly intermediate in size between the two are found among adult examples, and taking into consideration the restricted range of the smaller animal while the larger form in some of its subspecies ranges across the whole continent, I am forced to the theory that *macculus* is a distinct species. Mr. Thomas has recorded the two species from the same localities, and has named a subspecies of *macculus* from the Welle area, Congo,[1] a region where the larger species is abundant. The specimens from Rhino Camp, Lado, might, theoretically, be supposed the same as the Welle River form, but I am unable to distinguish them from the Uganda examples of *macculus*. In describing his *Arvicanthis pulchellus micropus* from Lado, Heller[2] apparently meant to name this small form, but in selecting his type-specimen he chanced to take an example of the larger species, which I am unable to distinguish from *Lemniscomys striatus massaicus*. The hind foot measurement of his type as given in the original description is erroneous. It is stated to be 23 millimeters, but the foot actually measures, dry and without claws, 24.5, while the collector's field measurement with claws was 27 millimeters. The hind foot in specimens I refer to *macculus* measures, dry, from 21 to 23 millimeters. Five of the specimens referred by Heller to *micropus*, including the single skin from Gondokoro, I have placed under *macculus*.

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[1] Ann. and Mag. Nat. Hist., ser. 8, vol. 18, p. 69. July, 1916.

For measurements of specimens see page 140.

LEMNISCOMYS STRIATUS MASSAICUS (Pagenstecher).

Plate 36.

1885. *Mus* (*Lemniscomys*) *barbarus* L. var. *massaicus* Pagenstecher, Jahrb. Hamb. Wiss. Anst., vol. 2, p. 45; Nat. Mus. Hamburg Ber., 1884, p. 45. (Lake Naivasha, British East Africa.)

1910. *Arvicanthis pulchellus massaicus* Roosevelt, African Game Trails, Amer. ed., pp. 473, 478 ("*masaicus*"); London ed., pp. 485, 490 ("*masaicus*").

1911. *Arvicanthis pulchellus micropus* Heller, Smithsonian Misc. Coll., vol. 56, No. 17, p. 9. February 28. (Rhino Camp, Lado; type in U. S. Nat. Mus.)

1912. *Lemniscomys pulchellus spermophilus* Heller, Smithsonian Misc. Coll., vol. 59, No. 16, p. 11. July 5. (Mt. Gargues, Mathews Range, British East Africa; type in U. S. Nat. Mus.)

Specimens.—One hundred and three, from the following localities:

Lado: Rhino Camp, 19, including 2 in alcohol and 7 odd skulls.

Uganda: Hoima, 2, including 1 in alcohol (Loring); Kampala, 1 (Loring); Kisingo, 3, including 2 in alcohol (Loring); Ledgus, 1 in alcohol (Loring).

British East Africa: Engare Narok River, 7, including 2 in alcohol (Loring); Engare Ndare River, 1 (Heller); Guas Ngishu

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[1] *Arvicanthis macculus akka*, Ann. and Mag. Nat. Hist., ser. 8, vol. 16, p. 479. Dec., 1915.

[2] Smithsonian Misc. Coll., vol. 56, No. 17, p. 9. Feb. 28, 1911.

Measurements of specimens of the Lemniscomys striatus group.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Length of nasals.	Length of mandible.	Upper tooth row (alveoli).	Lower tooth row (alveoli).	Condition of molars.
L. m. macculus.												
Lado:												
Rhino Camp	165188	Female	98	108	23.2	11.8	4.3	9.4	14.0	4.8	4.7	Little worn.
Do	165189	do	109	124	25.7	12.7	4.5	11.1	15.4	5.0	4.8	Moderately worn.
Uganda:												
Gondokoro	165172	do	97	107	24.2	12.6	3.9	10.2	15.2	4.9	4.7	Do.
Kisingo	165174	Male	111	102	24.8	12.9	4.4	9.8	15.7	5.0	5.0	Considerably worn.
Do	165178	do	122	118	27.0	13.3	4.6	10.3	16.7	5.0	4.8	Much worn.
Kabula Muliro	165206	Female	112	113	25.8	13.0	4.7	10.0	16.0	4.9	4.5	Do.
B. E. A.: Nzoia River	163631	do	95	94	23.8	12.3	4.4	10.0	14.5	5.0	4.8	Little worn.
L. s. massaicus.												
Lado:												
Rhino Camp	165180	Male	119	140	27.3	13.4	4.9	11.9	16.8	5.2	4.9	Moderately worn.
Do	165183	do	107	142	26.5	13.5	4.6	11.8	15.8	5.2	5.0	Do.
Do	165187	do	118	135	27.3	14.0	4.9	11.8	16.7	5.3	4.9	Considerably worn.
Do	165190	do	112	130	26.0	13.5	5.0	10.2	15.7	5.2	5.0	Moderately worn.
Do	[1] 164825	Female	114	125	25.7	13.0	4.8	10.7	15.9	5.2	4.8	Do.
Do	165182	do	99	134	25.0	13.2	4.9	9.8	15.3	5.0	5.0	Do.
Do	165184	do	122	134	27.6	14.4	4.7	11.6	17.2	5.3	5.1	Much worn.
Do	165185	do	118	133	27.8	13.7	4.7	10.9	16.8	5.4	5.1	Moderately worn.
Do	165186	do	115	147	25.7	13.8	4.9	11.0	15.5	5.3	5.2	Do.
Uganda:												
Hoima	165177	Male	116	134	26.7	13.6	4.8	11.2	16.0	5.0	5.1	Do.
Kisingo	165175	Female	123	141	28.0	14.6	4.9	11.6	17.6	5.2	5.3	Do.
Kampala	165173	Male	103	115	24.9	13.2	4.9	11.5	15.8	4.9	4.8	Do.
B. E. A.:												
Kaimosi	183815	do	118	....	27.6	14.2	5.0	11.7	16.7	5.2	5.2	Do.
Do	183817	do	115	....	28.2	13.8	4.6	11.5	16.6	5.2	5.3	Do.

Do	183818	...do.....	120	150	28.2	14.1	5.0	11.5	16.1	5.0	5.1	Considerably worn.
Do	183824	...do.....	125	141	27.8	14.0	5.0	11.8	16.5	5.1	5.1	Moderately worn.
Do	183816	Female..	112	136	26.2	13.9	4.8	10.7	16.1	5.0	5.2	Do.
Do	183819	...do.....	115	131	26.6	13.8	4.6	10.5	16.0	4.8	4.8	Do.
Naivasha	162689	Male....	113	128	27.6	14.2	4.8	11.8	16.2	5.3	5.2	Do.
Do	162690	...do.....	114	134	27.3	13.9	4.9	11.8	16.2	4.9	5.1	Do.
Do	162692	...do.....	107	137	27.0	13.2	4.5	11.4	16.4	5.1	5.2	Do.
Do	162706	...do.....	130	147	28.6	14.4	4.8	12.2	17.2	5.1	5.1	Do.
Do	162691	Female..	107	117	25.9	13.4	4.9	10.7	15.9	5.2	4.9	Do.
Do	162709	...do.....	109	116	26.3	13.9	4.6	11.3	16.8	5.4	5.3	Little worn.
Engare Narok River	162685	Male....	126	151	29.0	14.7	5.1	11.8	17.1	5.4	5.3	Much worn.
Do	162683	Female..	113	138	27.7	13.8	4.8	12.2	16.9	5.2	5.3	Moderately worn.
Do	162684	...do.....	121	143	28.2	14.6	5.0	12.0	17.0	5.4	5.3	Much worn.
Oljoro O Nyon River	162678	...do.....	135	....	27.1	14.0	4.8	11.8	17.0	5.2	5.2	Moderately worn.
Do	162682	...do.....	116	135	27.3	13.7	4.7	12.3	16.5	5.1	5.0	Much worn.
Mount Gargues	183840	Male....	120	....	27.4	13.6	4.7	11.3	16.6	5.3	4.9	Considerably worn.
Do	183841	...do.....	108	140	26.3	13.6	4.6	10.5	15.9	5.4	5.2	Moderately worn.
Do	183842	...do.....	118	150	27.6	13.9	4.7	11.3	16.2	5.2	5.2	Do.
Do	183834	...do.....	113	137	26.0	13.1	4.9	10.6	16.2	5.2	5.0	Do.
Do	183835	...do.....	112	132	27.0	13.8	5.0	11.5	16.7	5.4	5.3	Do.
Do	184191	...do.....	105	120	26.8	14.4	5.0	10.5	16.6	5.1	4.9	Do.
Do	[2] 181800	Female..	120	139	28.1	14.3	4.9	11.8	17.8	5.6	5.4	Considerably worn.
L. s. ardens.												
B. E. A.:												
Juja Farm	161764	...do.....	130	126	28.8	15.8	5.2	12.5	17.6	5.4	5.2	Do.
Kamiti	163635	...do.....	122	127	27.0	13.4	4.5	11.3	16.4	5.1	5.3	Moderately worn.
Do	163634	...do.....	129	135	28.1	13.7	4.9	11.8	16.7	5.3	5.0	Do.
Fort Hall	163642	Male....	118	122	27.5	14.3	4.6	11.2	16.7	5.3	4.9	Considerably worn.
Do	163658	...do.....	128	134	28.1	13.8	4.8	11.8	17.3	5.4	5.1	Moderately worn.
Do	163657	Female..	109	126	26.5	13.4	4.9	11.8	16.8	5.3	4.8	Do.
Wambugu	163654	Male....	127	152	28.4	13.6	4.8	12.3	17.3	5.4	5.2	Do.
Do	163652	Female..	116	136	26.6	14.0	5.0	11.1	16.3	5.2	4.9	Do.
Nyeri	163648	Male....	110	128	25.2	13.0	4.5	11.3	15.9	5.1	4.8	Do.

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[1] Type of *Arvicanthis pulchellus micropus* Heller.

[2] Type of *Lemniscomys pulchellus spermophilus* Heller.

Boma, 1 (Heller); Isiola River, 1 (Heller); Kaimosi, 19, including 6 in alcohol (Heller); Kakumega, 2 (Heller); Kibabe, Nandi Hills, Kisumu, 1 (Heller); Kisumu, 1 (Heller); Lake Naivasha, 12, including 2 in alcohol (Loring); Lukosa River, 3 (Heller); Mission, Kisumu, 1 (Heller); Mount Gargues, 13, including 1 in alcohol (Heller); Mount Kenia, west slope at 7,000 feet, 1 in alcohol (Heller); Naivasha Station, 10 (Loring, Mearns); Oljoro O Nyon River, 3 (Loring, Heller); Telek River, Sotik, 1 (Heller).

As will be noted from the above list of localities, this species has an extraordinarily extensive range in East Africa, much larger than most species of small mammals known from the region. While there is considerable variation in color and size it does not seem to have geographical significance, and I am unable to divide the form in any satisfactory way. The specimens from the vicinity of Kavirondo Gulf average darker than any other large lot but the difference after all is slight. The specimens from Lado, including the type of *Lemniscomys pulchellus micropus* (Heller) are perhaps slightly lighter in color than the average run of specimens from British East Africa, but they can be matched almost exactly by skins in the Naivasha series (type locality of *massaicus*) and the difference is entirely too little to recognize as of subspecific value. It may, as a matter of fact, be seasonal, as the Lado series was collected in January, while most of the East African material was taken at other seasons. The Mount Gargues series, allowing for the particularly fresh condition of pelage, is certainly indistinguishable from typical *massaicus*. The species seems to be one of very constant average coloration. Thomas, in writing of specimens of *striatus* from the Upper Congo, has said:

> Allowing for their variation in color according to freshness of fur, there seems remarkably little difference between these specimens and the E.-African *A. massaicus*, on the one hand, and true W.-African *A. striatus*, including *A. pulchellus*, on the other.

I can only distinguish our West African material by its slightly richer color, and specimens from Liberia and Cameroons are, as Mr. Thomas states, remarkably like the skins from British East Africa.

As shown in the tables of measurements, there is virtually no difference in size between specimens from all parts of the range. Additional measurements of the hind foot in large series of *massaicus*, give the following averages: Lado and Uganda, 25.2 millimeters; British East Africa, excepting Mount Gargues, 26.1; Mount Gargues, 25.7. These measurements were taken without claws, from the dry skin. The measurement of the hind foot of the type specimen of "*micropus*," as printed in the original description is erroneous. It is there given as 23 millimeters, but the foot dry without claws actually measures 24.5, and the collector's field measurement, with claws, is 27 millimeters.

Measurements of specimens of the Lemniscomys barbarus group.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Length of nasals.	Length of mandible.	Upper tooth row (alveoli).	Lower tooth row (alveoli).	Condition of molars.
L. b. zebra.												
Lado:												
Rhino Camp	165195	Male	106	129	24.8	12.8	4.3	9.8	14.9	5.1	4.9	Moderately worn.
Do	165201	...do	102	118	24.0	11.7	4.1	10.2	15.1	5.0	4.8	Do.
Do	165202	...do	102	112	25.2	12.6	4.2	10.5	15.7	5.3	5.2	Do.
Do	165191	Female.	89	120	23.9	11.9	4.3	....	14.1	4.8	4.8	Little worn.
Do	165193	...do	94	125	24.3	12.5	4.5	10.2	15.0	4.8	4.7	Moderately worn.
Do	165194	...do	96	124	25.2	12.6	4.2	10.2	15.4	5.1	5.0	Do.
Do	165196	...do	97	122	24.5	12.6	4.3	10.1	15.0	5.1	4.9	Do.
Do	165198	...do	97	133	24.7	12.7	4.3	10.7	15.0	4.8	4.8	Do.
Do	165200	...do	96	116	22.8	11.6	4.1	9.5	14.0	4.8	4.8	Do.
Do	165203	...do	111	....	....	12.8	4.2	11.4	15.7	5.2	4.9	Much worn.
Do	165204	...do	103	125	24.5	12.3	4.4	9.8	15.2	4.9	4.8	Moderately worn.
Do	165205	...do	112	....	....	....	4.5	10.5	16.2	5.3	5.1	Much worn.
Uganda: Gondokoro	165192	...do	104	115	24.4	12.5	4.4	10.0	15.0	5.1	4.8	Considerably worn.
L. b. albolineatus.												
B. E. A.: Ulukenia Hills	162884	Female.	106	109	25.2	13.5	4.3	10.8	15.8	5.2	5.0	Do.
L. b. convictus.												
B. F. A.:												
Mtoto Andei	181737	Male	100	113	24.4	13.3	4.3	10.5	14.8	5.1	5.1	Moderately worn.
Do	181739	...do	100	114	26.2	13.1	4.4	10.8	16.0	5.0	4.9	Much worn.
Do	181740	...do	95	112	23.4	12.7	4.0	9.8	14.7	5.0	4.8	Moderately worn.
Do	181738	Female.	100	113	24.8	13.2	4.1	10.5	15.3	5.0	4.8	Do.

Breeding records are furnished by the following collector's notes on embryos, taken from specimens prepared: Isiola River, June 30, four embryos; Kaimosi, January 24, two embryos; Kakumega, February 17, two embryos; Lake Naivasha, July 13, three embryos; Lake Naivasha, July 17, four embryos.

For measurements of specimens of this and the following subspecies of *Lemniscomys striatus* see pages 140–141.

LEMNISCOMYS STRIATUS ARDENS (Thomas).

1892. *Mus barbarus* True, Proc. U. S. Nat. Mus., vol. 15, p. 460. (Not of Linnæus.)

·1910. *Arvicanthis pulchellus ardens* Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 6, p. 313. September. (Rombo, Mount Kilimanjaro, German East Africa; type in British Museum.)

Specimens.—Fifty-two, from localities as follows:

British East Africa: Fort Hall, 13, including 3 in alcohol (Loring, Mearns); Juja Farm, 3, including 2 in alcohol (Loring); Kamiti, Athi Palins, 7, including 2 in alcohol (Loring); Nairobi, 1 (Mearns); Nyeri, 1 (Loring); Saba Saba, 2, including 1 in alcohol (Loring); Taveta, 1 in alcohol (Abbott); Thika River, 6, including 3 in alcohol (Loring, Mearns); Ulukenia Hills, 1 (Loring); Wambugu, 11, including 4 in alcohol (Loring).

German East Africa: Mount Kilimanjaro, 6, including 4 in alcohol (Abbott).

This geographical race is separated from true *massaicus* by the more reddish average coloration. While many examples of each race are indistinguishable, the lots as a whole are of quite different color. The richest colored examples are from Wambugu and Fort Hall. There is a great range of individual variation in the intensity of the reddish suffusion.

LEMNISCOMYS BARBARUS ZEBRA (Heuglin).

1864. *Mus zebra* Heuglin, Nov. Act. Acad. Caes. Leop., vol. 31, Abhandl., No. vii, p. 10. ("Lande der Req-Neger, Djur und Bongo," Sudan.)

Specimens.—Twenty, from localities as follows:

Lado: Rhino Camp, 17, including 5 in alcohol (Loring).

Uganda: Gondokoro, 2, including 1 in alcohol (Loring); Nimule, 1 in alcohol (Heller).

For measurements of specimens of this and other subspecies of *Lemniscomys barbarus* see page 143.

LEMNISCOMYS BARBARUS ALBOLINEATUS (Osgood).

1910. *Arvicanthis barbarus albolineatus* Osgood, Field Mus. Zool. ser., vol. 10, No. 2, p. 11. February. (Ulukenia Hills [Lukenya Mountain], British East Africa; type in Field Mus. Nat. Hist., Chicago.)

1910. *Arvicanthis barbarus albolineatus* Roosevelt, African Game Trails, Amer. ed., p. 473; London ed., p. 485.

Specimen.—One topotype:

British East Africa: Ulukenia Hills, Athi Plains (Loring).

Measurements of specimens of Rhabdomys p. diminutus.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Skull: Condylobasal length.	Zygomatic breadth.	Interorbital breadth.	Length of nasals.	Length of mandible.	Upper tooth row (alveoli).	Lower tooth row (alveoli).	Condition of molars.
B. E. A.:												
Naivasha	162718	Male	105	....	25.7	13.8	4.1	9.8	15.8	4.9	4.8	Moderately worn.
Do.	162721	..do.	111	87	25.7	13.3	4.2	8.8	14.8	4.9	4.8	Do.
Do.	162728	..do.	119	....	25.1	13.1	4.0	9.4	15.3	4.8	4.6	Do.
Do.	162729	..do.	108	94	24.1	12.1	4.0	8.8	11.8	4.9	4.8	Little worn.
Do.	162737	..do.	112	87	24.9	13.0	4.1	9.4	15.0	5.2	4.9	Considerably worn.
Do.	162723	Female	113	97	26.4	13.6	4.4	9.0	16.2	4.8	4.8	Moderately worn.
Do.	162730	..do.	121	94	25.2	13.0	4.0	9.1	15.8	4.5	4.8	Do.
Do.	162739	..do.	120	92	26.2	13.3	3.9	9.5	15.9	5.1	5.1	Do.
Guas Ngishu Plateau	164161	Male	110	87	24.2	13.0	4.3	8.3	15.1	4.7	4.8	Do.
Do.	164160	Female	105	94	23.9	12.5	3.9	8.3	14.2	4.8	4.8	Do.
Do.	164162	..do.	105	90	24.4	12.7	4.1	8.8	14.9	4.9	4.8	Do.
Aberdare Mountains	164159	Male	122	87	25.9	13.8	4.2	9.4	16.3	5.1	5.1	Much worn.
Do.	183098	..do.	103	80	24.2	12.2	4.0	8.4	14.5	4.7	4.7	Moderately worn.
Do.	183097	Female	108	92	25.2	13.8	4.1	8.8	15.2	4.8	4.8	Considerably worn.
Do.	183099	..do.	98	....	23.3	12.7	3.9	8.8	13.9	4.6	4.5	Much worn.
Do.	183100	..do.	110	89	25.0	12.9	4.2	9.3	15.3	4.8	4.8	Moderately worn.
Nyeri	164168	Male	115	85	24.6	12.3	4.0	8.2	....	4.8	....	Little worn.
Do.	164170	..do.	112	84	24.0	12.3	4.1	8.9	14.9	4.8	4.8	Moderately worn.
Do.	164182	..do.	124	82	25.7	12.8	4.2	9.3	15.2	4.8	4.8	Do.
Do.	164166	Female	115	....	24.7	12.5	3.9	8.8	15.8	4.8	4.5	Do.
Do.	164173	..do.	98	74	23.0	11.6	3.9	7.4	14.0	4.6	4.5	Little worn.
Do.	164183	..do.	124	95	26.5	13.4	4.4	9.3	15.6	4.8	4.5	Much worn.
Mount Kenia	164185	..do.	....	....	23.9	12.0	4.0	8.4	15.0	5.1	4.9	Moderately worn.
Do.	164187	..do.	120	96	26.3	13.2	4.3	9.5	16.5	5.0	4.8	Do.
Do.	164190	..do.	121	87	25.1	12.7	4.2	8.8	15.1	5.1	4.8	Do.
Do.	164191	..do.	106	85	23.6	11.6	3.8	8.2	15.2	4.8	4.9	Do.

LEMNISCOMYS BARBARUS CONVICTUS (Osgood).

1910. *Arvicanthis barbarus convictus* OSGOOD, Field Mus. Zool. ser., vol. 10, No. 2, p. 10. February. (Voi, British East Africa; type in Field Mus. Nat. Hist., Chicago.)

Specimens.—Five, including 1 in alcohol, as follows:

BRITISH EAST AFRICA: Mtoto Andei (Heller).

Genus RHABDOMYS Thomas.

1916. *Rhabdomys* THOMAS, Ann. and Mag. Nat. Hist., ser. 8, vol. 18, p. 69. July. (*R. pumilio*.)

The group of species of the old genus *Arvicanthis* including *pumilio* and its allies has been recognized by Thomas as a distinct genus. The forms all have four dark stripes on the back and a normal fifth finger with claw.

RHABDOMYS PUMILIO DIMINUTUS (Thomas).

1892. *Isomys pumilio diminutus* THOMAS, Proc. Zool. Soc. London, 1892, p. 551. (Mianzini, east of Lake Naivasha, British East Africa; type in British Museum.)

1910. *Arvicanthis pumilio diminutus* ROOSEVELT, African Game Trails, Amer. ed., pp. 473 and 479; London ed., pp. 485 and 490.

Specimens.—Eighty-seven, from localities as follows:

BRITISH EAST AFRICA: Aberdare Mountains, 7, including 1 in alcohol (Heller); Guas Ngishu Plateau, 30 miles north of Ravine, 5, including 2 in alcohol (Heller); Laikipia, 1 in alcohol (Heller); Mount Kenia, 19, including 4 in alcohol (Loring, Mearns); Naivasha Station, 28, including 2 in alcohol (Loring); Nyeri, 27, including 4 in alcohol (Loring).

Loring found two females each with five large fetuses at Nyeri, September 16; and one at the same place, September 17, with three fetuses. Most of the Mount Kenia specimens are from the West Kenia Forest Station at 7,500 feet altitude, but Doctor Mearns caught one specimen at 10,000 feet on Kenia, and Heller found the species common on the summit of the Aberdare Range. Specimens from Nyeri and Mount Kenia average slightly more reddish than the Naivasha skins, but the difference is insignificant and may be seasonal, as the Naivasha specimens were collected in July and early August while the Kenia material was taken in September and October. For measurements see page 145.

Genus OTOMYS Cuvier.

1823. *Otomys* CUVIER, Dents Mamm., p. 168. (*O. irroratus*.)

1831. *Otomis* BONAPARTE, Giorn. Arcad. di Sci. Lett. Art., Roma, vol. 53, p. 193.

1918. *Otomys* THOMAS, Ann. and Mag. Nat. Hist., ser. 9, vol. 2, p. 207. September. (Revision of superspecific groups.)

In listing the swamp rats in the collection I have followed the arrangement of Dollman,[1] which seems quite satisfactory so far as our material is concerned. In cases where alcoholic specimens are from localities represented by good series of skins and skulls, it has seemed unnecessary to remove the skulls. Such specimens have been identified with the series of skins and skulls taken by the same collector at the same time and place.

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[1] On the Swamp-Rats (*Otomys*) of East Africa, Ann. and Mag. Nat. Hist., ser. 8, vol. 15, pp. 149-170. January, 1915.

For measurements of specimens of the swamp rats of the genus *Otomys* see table, pages 150–151.

OTOMYS THOMASI THOMASI Osgood.

1910. *Otomys thomasi* OSGOOD, Field Mus. Nat. Hist., Zool. ser., vol. 10, No. 2, p. 9. February. (Molo, British East Africa; type in Field Mus., Chicago.)

Specimen.—One, as follows:

BRITISH EAST AFRICA: Guas Ngishu Plateau, 20 miles north of Ravine (Heller).

OTOMYS THOMASI SQUALUS Dollman.

1915. *Otomys thomasi squalus* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 15, p. 155. January. (Mount Kinangop, Aberdare Range, British East Africa, 12,000 feet; type in British Museum.)

Specimens.—Twenty-one, including seven in alcohol, as follows:

BRITISH EAST AFRICA: Aberdare Mountains, summit, 10,500 to 11,000 feet (Heller).

Two females collected on October 11 contained one large embryo each.

OTOMYS ORESTES Thomas.

1900. *Otomys irroratus orestes* THOMAS, Proc. Zool. Soc. London, 1900, p. 175. (Teleki Valley, Mount Kenia, at 13,000 feet, British East Africa; type in British Museum.)

1910. *Otomys irroratus orestes* ROOSEVELT, African Game Trails, Amer. ed., p. 472; London ed., p. 484.

Specimens.—Sixteen, as follows:

BRITISH EAST AFRICA: Mount Kenia (Loring, Mearns).

These specimens were trapped on the western side of the mountain at altitudes of 10,700, 13,500, and 13,700 feet. The last upper molar has six laminæ in all specimens except one (No. 164329) in which there are distinctly seven, the last very small. This specimen is unquestionably *orestes*, however, as it agrees with the other specimens of the series in color, size, and the peculiar arched appearance of the skull, as opposed to *O. tropicalis*. It is the most aged specimen in the series.

OTOMYS DOLLMANI Heller.

Plate 37.

1912. *Otomys orestes dollmani* HELLER, Smithsonian Misc. Coll., vol. 59, No. 16, p. 5. July 5. (Mount Gargues, Mathews Range, British East Africa, 7,000 feet; type in U. S. Nat. Mus.)

Specimens.—Seven, including one odd skull, as follows:

BRITISH EAST AFRICA: North Creek, Mount Gargues, at 6,000 feet (Heller).[1]

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[1] Stated 7,000 feet in original description but specimens are all labeled 6,000 feet.

This form while agreeing with *Otomys orestes* of Mount Kenia in having only six laminæ in the last upper molar differs so greatly in other characters that it should not be considered a subspecies of *orestes* unless actual intergrading specimens are found. It is much darker in color, has a considerably longer tail, and the skull lacks almost entirely any appearance of the highly arched interorbital region or wide spreading zygomata of *orestes*. The skull is in fact almost exactly like skulls of the *tropicalis* group except for small size and the lamina formula.

OTOMYS TROPICALIS TROPICALIS Thomas.

1902. *Otomys irroratus tropicalis* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 10, p. 314. October. (Western slope of Mount Kenia, 10,000 feet, British East Africa; type in British Mus.)

Specimens.—One hundred and six, including 43 in alcohol, as follows:

British East Africa: Mount Kenia, west slope (Loring, Mearns).

These specimens were collected at altitudes ranging from 7,500 feet up to 13,700 feet.

About half a dozen specimens from this large series have eight laminæ in the last upper molars; the additional lamina small and subcircular. There is considerable variation in specimens of the swamp rat which I have here placed under *tropicalis*, but I have been unable to sort the material out into two forms. I have mistrusted at times during work on the genus that there is a form represented in the Kenia material which is related to *Otomys thomasi squalus* of the Aberdare range. In the Aberdares the two groups, *thomasi* and *tropicalis*, are perfectly distinct and easily separated, however, a condition which does not exist on Kenia unless I have been confused by mismatched skulls in the Kenia collection.

Mearns records the color of the iris in *O. tropicalis* as hazel brown and the mammæ as two pairs, inguinal, close together.

OTOMYS TROPICALIS ELGONIS Wroughton.

1910. *Otomys irroratus elgonis* Wroughton, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 207. February. (Elgonyi, Mt. Elgon, British East Africa; type in British Museum.)

Specimens.—Fifty, from localities as follows:

British East Africa: Aberdare Mountains, summit at 11,000 feet, 4 (Heller); Changongorra, Aberdare Mountains, 5 (Heller); Eldoma Ravine, 12 miles north of Ravine Station, 8, including 7 in alcohol (Heller); Guas Ngishu Plateau, 30 miles north of Ravine, 4 (Heller); Kaimosi, 17, including 2 in alcohol (Heller); Kakumega, 1 (Heller); Mount Kenia, west side at 7,000 feet, 1 (Heller); Naivasha Plains, base of Aberdare Mountains, 1 (Heller); Nyeri, 10 miles east, 1 (Heller); Nzoia River, Guas Ngishu Plateau, 8, including 4 in alcohol, (Heller).

The range of this dark form meets that of typical *tropicalis* on the lower levels of Mount Kenia. A specimen from 7,000 feet on the west side of the mountain is clearly referable to *elgonis*, while skins from 7,500 feet are placed with *tropicalis*. Specimens from the summit of the Aberdares are slightly less richly colored than are skins from lower down, but otherwise the series is remarkably uniform in its deep coloration, and skins from the Kakumega and Kaimosi regions are not distinguishable in color from skins collected at the eastern base of the Aberdares. Kaimosi specimens average slightly smaller than specimens from other parts of the range of the form.

A female collected at Kaimosi, January 27, contained one embryo; one collected at Changongorra, October 10, two embryos; and one from the same locality at the same time, one large embryo.

OTOMYS ANGONIENSIS ELASSODON Osgood.

1892. *Otomys irroratus* True, Proc. U. S. Nat. Mus., vol. 15, p. 464. (Not of Brants.)

1910. *Otomys angoniensis elassodon* Osgood, Field Mus. Nat. Hist., Zool. ser., vol. 10, No. 2, p. 10. February. (Naivasha, British East Africa; type in Field Mus. Nat. Hist., Chicago.)

Specimens.—Twenty-two, from the following localities:

British East Africa: Lake Naivasha, 1 (Loring); Mayo River, Laikipia, 15 miles north of Nyeri, 3, including 2 in alcohol (Heller); Nairobi, 1 in alcohol (Mearns); Naivasha Station, 10, including 2 in alcohol (Loring); Northern Guaso Nyiro River, 1 in alcohol (Cuninghame); Nyeri, 2 (Loring).

German East Africa: Mount Kilimanjaro, 4 (Abbott).

Kilimanjaro specimens seem inseparable from specimens collected at Naivasha. The alcoholic specimens from Nairobi and from the Northern Guaso Nyiro River are both young and not determinable with certainty, but appear to belong to this form, which has been recorded from these localities.

OTOMYS NYIKÆ CANESCENS Osgood.

1910. *Otomys nyikæ canescens* Osgood, Field Mus. Nat. Hist., Zool. ser., vol. 10, No. 2, p. 10. February. (Kijabe, British East Africa; type in Field Mus. Nat. Hist., Chicago.)

Specimens.—Sixteen, from the following localities:

British East Africa: Engare Narok River, 8 (Loring, Heller); Engare Ndare River, 2 (Heller); Njoro O Nyiro River, 1(Heller); Southern Guaso Nyiro River, 2, including 1 in alcohol (Loring); Ulukenia Hills, 3, including 1 in alcohol (Loring).

Heller records three embryos in a female collected at the Engare Ndare River, June 29.

Measurements of specimens of Otomys from East Africa.

Form and locality.	No.	Sex.	Head and body.	Tail verte-bræ.	Hind foot.[1]	Skull: Condy-lobasal length.	Zygo-matic breadth.	Height from sinciput to alveolar border of m^3.	Greatest breadth of nasals.	Inter-orbital constric-tion.	Length of upper tooth row, crowns.	Observations.
O. t. thomasi.												
Guas Ngishu Plateau	164290	Female	162	88	30	38.3	20.5	13.6	7.3	3.8	8.2	Teeth considerably worn.
O. t. squalus.												
Aberdare Mountains	184024	Male	170	96	26	37.9	21.1	12.6	7.8	4.3	8.6	Teeth moderately worn.
Do	184031	...do	150	91	28	36.5	20.0	11.4	7.1	4.1	8.0	Do.
Do	184035	...do	155	93	27	37.0	19.6	13.0	7.0	3.9	8.6	Do.
Do	164280	Female	175	94	29	36.5	19.3	11.3	7.2	4.2	8.6	Do.
Do	184030	...do	170	90	26	36.4	20.3	12.0	7.1	4.4	8.3	Teeth considerably worn.
Do	184033	...do	150	78	25	35.2	19.5	12.5	6.7	4.3	8.2	Teeth moderately worn.
Do	184039	...do	170	92	27	37.7	19.6	12.2	7.4	4.3	9.0	Do.
O. orestes.												
Mount Kenia	164313	Male	151	70	30	33.4	18.1	11.4	....	3.9	7.4	Teeth little worn.
Do	164329	...do	175	77	30	36.4	19.7	13.0	6.5	3.9	8.5	Teeth considerably worn.
Do	164333	Female	....	....	....	33.1	16.8	11.4	6.4	3.8	7.2	Teeth little worn.
Do	164357	...do	163	65	28	....	18.5	12.0	6.4	4.0	7.9	Teeth moderately worn.
Do	164358	...do	168	66	30	32.8	17.5	12.1	6.2	3.9	7.0	Teeth little worn.
O. dollmani.												
Mount Gargues	[2] 181790	Male	150	88	25	34.2	17.8	10.8	6.5	4.2	7.2	Teeth moderately worn.
Do	184042	...do	150	105	27	35.0	17.8	10.8	6.8	....	7.2	Do.
Do	184041	Female	140	91	26	32.1	....	9.9	6.3	4.3	6.9	Teeth little worn.
Do	184043	...do	138	88	25	31.2	16.2	9.9	6.2	4.0	6.9	Do.
Do	184044	...do	150	95	25	34.4	17.9	10.9	6.7	4.1	7.7	Teeth considerably worn.
Do	184046	...do	140	85	23	32.7	16.9	10.3	6.1	4.2	7.0	Teeth moderately worn.
O. t. tropicalis.												
Mount Kenia	164291	Male	175	92	33	36.7	17.5	11.5	6.8	4.0	8.3	Do.
Do	164352	...do	178	80	34	39.8	20.1	12.8	7.9	4.2	8.7	Do.
Do	164353	...do	174	86	33	38.9	19.9	12.5	7.3	4.1	8.5	Do.
Do	164360	...do	184	87	32	38.7	....	13.2	7.4	4.5	9.1	Teeth considerably worn.

Do	164365	...do...	170	70	32	37.0	20.1	11.6	7.3	4.5	8.5	Teeth moderately worn.
Do	164361	Female	181	83	32	38.3	....	11.8	7.4	4.1	8.9	Do.
Do	164372	...do...	182	90	33	40.0	....	13.2	7.8	4.5	9.0	Teeth considerably worn.
Do	164375	...do...	182	88	31	37.3	....	12.1	7.0	3.8	8.6	Do.
O. t. elgonis.												
Guas Ngishu Plateau	164282	Male	205	102	33	41.3	21.0	13.2	8.2	4.9	8.8	Do.
Do	164286	Female	180	98	34	41.2	20.9	13.3	8.0	4.4	8.2	Do.
Do	164287	...do...	175	92	32	38.5	18.6	12.2	7.3	4.3	7.9	Do.
Ravine	164281	Male	180	98	34	39.5	20.1	12.6	7.3	4.4	8.6	Do.
Kaimosi	184003	...do...	165	95	27	36.4	18.8	11.0	7.2	4.5	7.7	Teeth moderately worn.
Do	184004	...do...	160	99	27	38.2	18.9	11.7	7.1	4.5	8.4	Teeth considerably worn.
Do	184017	...do...	170	98	28	36.7	18.5	11.2	6.4	4.6	8.1	Teeth moderately worn.
Do	184014	Female	160	83	26	36.2	18.5	11.4	6.8	4.4	8.5	Teeth considerably worn.
Do	184016	...do...	168	....	26	36.0	18.7	11.1	6.8	4.8	8.2	Do.
Naivasha Plain	184036	Male	170	102	29	40.1	21.4	12.8	7.8	4.3	8.9	Do.
Aberdare Mountains	184038	...do...	170	92	28	38.9	18.9	12.0	7.6	4.2	8.9	Do.
Do	184037	Female	170	83	27	40.1	19.7	12.6	7.5	4.2	8.5	Do.
O. a. elassodon.												
Laikipia	184002	Male	170	....	28	38.3	20.3	13.3	7.9	4.4	8.0	Teeth moderately worn.
Naivasha Station	162346	...do...	171	99	31	37.9	20.4	12.9	7.5	4.5	8.0	Do.
Do	162349	...do...	172	89	30	37.9	19.8	12.8	7.7	4.2	8.0	Do.
Do	162340	Female	182	95	30	38.6	20.1	13.0	7.8	4.1	8.1	Do.
Do	162341	...do...	182	94	31	39.0	20.5	13.4	7.0	4.4	8.4	Do.
Do	162350	...do...	173	100	31	37.5	19.4	12.3	7.7	5.0	7.9	Do.
Do	162351	...do...	185	98	31	40.4	20.4	13.6	8.6	4.5	7.7	Do.
Mount Kilimanjaro	37374	Male	....	....	....	37.1	19.4	12.4	7.1	4.2	8.0	Do.
Do	37375	...do...	....	....	....	38.7	19.7	13.1	8.8	4.5	8.2	Do.
O. n. canescens.												
Southern Guaso Nyiro	162330	Female	169	89	28	35.8	18.8	12.6	8.0	4.4	8.5	Teeth considerably worn.
Engare Narok River	162837	...do...	162	97	28	35.7	19.0	12.3	8.1	4.4	8.5	Teeth moderately worn.
Engare Ndare River	184000	...do...	165	75	25	....	....	12.1	8.0	4.5	8.3	Do.
Njoro O Nyiro River	162327	Male	175	83	29	36.4	19.5	12.6	8.4	4.4	8.4	Teeth considerably worn.
Ulukenia Hills	164327	...do...	161	....	30	34.9	19.0	11.6	7.4	4.8	8.3	Teeth moderately worn.
Do	164328	Female	164	81	28	33.9	18.0	11.5	7.7	4.4	7.6	Teeth little worn.

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[1] Hind foot measurements taken by collectors and not always comparable one series with another.

[2] Type.

Family GRAPHIURIDÆ.

Genus GRAPHIURUS Smuts.

1832. *Graphiurus* SMUTS, Enum. Mamm. Capensium, p. 32. (*G. capensis*=*G. ocularis*.)

Two distinct species-groups of dormice are found in the collections from eastern equatorial Africa, and are readily distinguishable by size of skull. The larger forms appear to be subspecies of the South African *Graphiurus murinus* and the smaller forms all closely resemble *Graphiurus parvus*.

GRAPHIURUS MURINUS GRISEUS Allen.

Plate 37.

1912. *Graphiurus microtis griseus* G. M. ALLEN, Bull. Mus. Comp. Zoöl., vol. 54, p. 440. April. (Northern Guaso Nyiro River, British East Africa; type in Mus. Comp. Zoöl. at Harvard.)

1912. *Graphiurus murinus johnstoni* HELLER, Smithsonian Misc. Coll., vol. 59, No. 16, p. 2. July 5. (Mount Gargues, Mathews Range, British East Africa; type in U. S. Nat. Mus. Not *Graphiurus johnstoni* Thomas, 1897.)

Specimens.—Twelve, from localities as follows:

BRITISH EAST AFRICA: Burgunett River, Meru Road, 1 (Heller); Isiola River, 3 (Heller); Lesiweru River, Meru Road, 1 (Heller); Mount Gargues, 3 (Heller); Mount Lololokwi, 3 (Heller); Nyuki River, 1 in alcohol (Heller).

This form of *Graphiurus murinus* is very much like *G. m. saturatus*, but is grayer in color. The specimen from Lesiweru River is distinctly intermediate between *griseus* and *raptor;* it has the skull and large auditory bullæ of *griseus* with the color of the Kenia subspecies. Through the kindness of the authorities of the Museum of Comparative Zoölogy I have been able to borrow the type-specimen of *Graphiurus microtis griseus* Allen, and thus by actual comparison to prove the identity of this form with Heller's "*Graphiurus murinus johnstoni*," the name of which was already preoccupied by the *Graphiurus johnstoni* of Thomas.

GRAPHIURUS MURINUS RAPTOR Dollman.

1910. *Graphiurus raptor* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 96. January. (West slope of Mount Kenia, British East Africa, at 11,000 feet; type in British Museum.)

1910. *Graphiurus raptor* ROOSEVELT, African Game Trails, Amer. ed. p. 472; London ed., p. 484.

1914. *Graphiurus* sp. COCKERELL, MILLER, and PRINTZ, Zool. Anz., vol. 44, p. 435. June 23.

Specimens.—Twenty-nine, as follows:

BRITISH EAST AFRICA: West side of Mount Kenia at 8,500, 10,000 and 10,700 feet, 29, including 1 in alcohol (Loring, Mearns).

This high mountain subspecies is easily distinguished from the neighboring forms by its cinnamon gray coloration and small auditory bullæ. Intergradation with *Graphiurus murinus griseus* is shown by specimens from Meru Road, listed under *griseus*, and doubtless takes place at various points on the lower slopes of the mountain.

GRAPHIURUS MURINUS SATURATUS Dollman.

1910. *Graphiurus microtis saturatus* DOLLMAN, Ann. and Mag. Nat. Hist., ser. 8, vol. 5, p. 204. February. (South face of Mount Elgon, British East Africa, at 9,000 feet; type in British Museum.)

1910. *Graphiurus parvus* ROOSEVELT, African Game Trails, Amer. ed., pp. 472, 476; London ed., pp. 484, 488. (Part: reference to Sotik; not *Graphiurus parvus* of True.)

Specimens.—Forty-three, from localities as follows:

BRITISH EAST AFRICA: Engare Narok River, 1 (Loring); Kabalolot Hill, Sotik, 1 (Heller); Kaimosi, 21 (Heller); Kisumu, 1 (Heller); Lake Naivasha, south side, 1 (Mearns); Mount Kenia, west side at 7,000 feet, 1 (Heller); Naivasha Station, 10 (Loring); Nzoia River, Guas Ngishu Plateau, 1 (Heller); Oljoro O Nyon River, 2 (Heller, Loring); Southern Guaso Nyiro River, 4 (Loring).

This dark-colored subspecies of *murinus* has a wide range in western British East Africa. Specimens from the Southern Guaso Nyiro and Sotik seem indistinguishable from skins and skulls from Kaimosi and the Guas Ngishu Plateau. The specimen from the west side of Mount Kenia at 7,000 feet is in some respects peculiar and may represent another race, still undescribed. It has a skull decidedly larger than the average for *saturatus*, with wider rostrum and higher braincase. The coloration is hardly matched in the series of *saturatus* and is especially dark and rich on the underparts. The auditory bullæ are large. The specimen is clearly best referred to *saturatus*, rather than to *raptor* or *griseus*, and Dollman has already recorded *saturatus* from this vicinity. No specimen in our large series of *saturatus*, or indeed of any other East African form of *Graphiurus*, approaches it in the dimensions of the skull.

GRAPHIURUS MURINUS ISOLATUS Heller.

1892. *Eliomys murinus* TRUE, Proc. U. S. Nat. Mus., vol. 15, p. 459. (Not of Desmarest.)

1912. *Graphiurus murinus isolatus* HELLER, Smithsonian Misc. Coll., vol. 59, No. 16, p. 3. July 5. (Mount Umengo, Taita Mountains, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Nineteen, from localities as follows:

BRITISH EAST AFRICA: Mount Mbololo, 5 (Heller); Mount Umengo, 11, including 1 in alcohol (Heller).

GERMAN EAST AFRICA: Mount Kilimanjaro, 3 (Abbott).

This dark colored subspecies resembles *G. m. saturatus* externally, but the skull is easily separated from skulls of *saturatus* by the much smaller bullæ. On Mount Umengo Heller found three females pregnant as follows: November 11, two embryos; November 12, three embryos; November 13, four embryos. Doctor Abbott obtained the

Kilimanjaro specimens at an altitude of 5000 feet. The label of one of his female skins has written on it the following notes: "Taken, with the male, from a nest containing four young ones; nest globular, about 5 inches in diameter, with hole in side; situated in a bush 5 feet from ground. Nest made of grass and strips of banana fronds, lined with fine grass."

The four alcoholic specimens from Kilimanjaro listed by True in 1892[1] can not now be found in the collection.

GRAPHIURUS PARVUS PARVUS (True).

Plate 37.

1893. *Eliomys parvus* TRUE, Proc. U. S. Nat. Mus., vol. 16, p. 601. October 25. (Tana River, between the coast and Hameye, British East Africa; type in U. S. Nat. Mus.)

1909. *Eliomys parvus* LYON AND OSGOOD, Bull. U. S. Nat. Mus., No. 62, p. 159. January 28.

Specimens.—Four, from the following localities:

BRITISH EAST AFRICA: Engare Ndare River, Northern Guaso Nyiro, 2 (Heller); Jambeni Mountains, 1 in alcohol, skull removed (Chanler); Tana River, 1 (Chanler and von Höhnel).

The dormouse described by Dollman[2] from Nyama Nyango, Northern Guaso Nyiro, as *Graphiurus brockmani internus*, seems likely to prove inseparable from *Graphiurus parvus parvus*.

GRAPHIURUS PARVUS DOLLMANI Osgood.

1910. *Graphiurus parvus dollmani* OSGOOD, Field Mus. Nat. Hist., Zool. ser., vol. 10, No. 3, p. 15. April 7. (Ulukenia Hills, British East Africa; type in Field Mus. Nat. Hist.)

Specimens.—Three, from localities as follows:

BRITISH EAST AFRICA: Mount Mbololo, 1 (Heller); Mount Sagalla, 2 (Heller).

These specimens have been compared with the type of *dollmani*, lent by the authorities of the Field Museum, and seen inseparable. The skulls of *dollmani* are larger than skulls of typical *parvus*. The Sagalla specimens, both females, are marked on the labels as caught in the mud nest of a swallow on the under side of a large rock, in roof of a cave; each contained four embryos, November 18.

GRAPHIURUS PERSONATUS Heller.

Plate 38.

1911. *Graphiurus personatus* HELLER, Smithsonian Misc. Coll., vol. 56, No. 17, p. 2. February 28. (Rhino Camp, Lado Enclave; type in U. S. Nat. Mus.)

Specimen.—One, the type, from—

LADO: Rhino Camp (Loring).

This dormouse is closely related to *G. parvus* and will doubtless prove to be only a geographical race of that older-named form.

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[1] Proc. U. S. Nat. Mus., vol. 15, p. 459. 1892.

[2] Ann. and Mag. Nat. Hist., ser. 8, vol. 9, p. 318. March, 1912.

Measurements of adult specimens of Graphiurus.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Interorbital breadth.	Upper tooth row.	Length of mandible.
G. m. griseus.											
Mount Lololokwi	182850	Female	82	77	15.8	21.8	12.2	12.1	4.5	3.1	12.4
Mount Gargues	[1] 181787	Male	92	80	16.8	25.3	14.4	12.9	4.6	3.3	13.3
Do	182848	...do	90	76	15.5	24.[illegible]	14.5	12.9	4.3	3.0	13.9
Do	182849	Female	88	74	15.8	23.3	14.0	12.7	4.3	3.1	13.3
Isiola River	182882	Male	95	80	15.9	25.1	14.2	12.9	4.5	......	13.7
Do	182883	Female	80	72	15.6	21.8	12.8	12.4	4.4	3.1	12.4
Meru Road	182875	...do	96	70	16.3	23.8	14.3	12.9	4.6	2.9	13.5
Northern Guaso Nyiro	[2] 8244	Male	82	79	......	24.8	14.7	12.9	4.6	3.3	13.0
G. m. raptor.											
Mount Kenia	164254	Male	102	......	17.3	24.2	14.4	12.5	4.6	3.3	14.2
Do	164260	...do	89	77	16.8	24.1	14.4	12.7	4.4	3.2	13.9
Do	164267	...do	103	78	17.4	24.8	14.5	13.3	4.8	3.3	13.9
Do	164272	...do	101	89	16.0	24.7	14.2	12.4	4.6	3.3	14.5
Do	164274	...do	104	79	17.4	24.6	15.3	13.2	4.5	3.3	13.9
Do	164253	Female	96	74	16.7	23.7	14.3	12.4	4.5	3.1	13.4
Do	164257	...do	95	80	16.4	24.2	14.1	12.6	4.5	3.0	13.9
Do	164258	...do	96	78	16.9	24.0	13.7	12.5	4.5	3.0	13.7
Do	164268	...do	86	74	16.6	22.7	13.1	12.1	4.7	3.2	13.3
G. m. saturatus.											
Kaimosi	182859	Male	100	......	16.6	24.7	15.1	12.6	4.5	3.4	14.1
Do	182862	...do	100	80	17.2	24.9	14.7	12.8	4.2	3.3	13.8
Do	182863	...do	92	......	16.7	24.3	15.2	12.6	4.5	3.3	14.5
Do	182871	...do	90	83	15.5	23.3	14.4	12.6	4.4	3.0	12.9
Do	182872	...do	90	......	16.2	23.3	13.8	12.9	4.6	3.0	13.4
Do	182866	Female	92	......	16.4	23.5	14.0	13.1	4.3	3.0	13.9
Do	182870	...do	92	81	15.5	23.5	14.3	12.7	4.4	3.1	13.6
Nzoia River	164276	...do	85	80	16.1	22.7	13.5	12.3	4.4	3.0	12.7
Naivasha	162244	Male	94	74	15.8	24.8	14.4	12.7	4.7	3.0	14.2
Do	162243	Female	95	......	16.4	24.4	14.7	12.3	4.4	3.0	13.7
West side Kenia	164275	Male	105	......	17.3	25.9	15.8	13.3	5.3	3.4	14.6
Oljoro O Nyon	162226	...do	95	84	16.3	24.5	14.7	12.7	4.5	3.4	14.3
Do	162228	Female	82	......	16.3	21.8	12.3	12.1	4.4	3.4	12.3
Engare Narok	162233	...do	83	77	15.6	22.2	13.5	12.0	4.3	3.1	13.7
Southern Guaso Nyiro	162232	Male	89	60	15.4	23.7	14.4	12.8	4.3	3.0	13.4
Do	162229	Female	91	70	14.4	23.0	14.3	12.5	4.6	3.2	13.1
Do	162230	...do	93	76	16.0	23.2	14.1	12.7	4.2	3.1	13.3
Do	162231	...do	86	80	16.6	23.1	14.0	12.6	4.4	3.1	13.7
Kabalolot Hill	181734	...do	95	......	16.3	24.0	14.7	13.1	4.8	3.0	12.7
G. m. isolatus.											
Mount Mbololo	182836	Male	100	......	18.1	24.8	15.2	12.8	4.8	3.7	14.0
Do	182837	Female	100	85	17.3	24.6	15.1	13.1	4.8	3.7	14.0
Do	182838	...do	95	82	18.2	24.0	14.7	12.7	4.7	3.5	13.9
Mount Umengo	182841	Male	100	......	17.9	25.2	15.1	12.9	4.8	3.5	14.3
Do	182843	...do	95	82	18.0	24.3	14.7	12.8	4.6	3.5	14.0
Do	182845	...do	90	81	18.2	24.3	14.7	13.1	4.6	3.5	14.5
Do	[3] 181788	Female	95	90	17.8	......	15.3	......	4.5	3.6	......
Do	182839	...do	92	88	18.3	24.5	14.5	12.4	4.8	3.6	13.8

[1] Type of *Graphiurus murinus johnstoni* Heller.

[2] Type of *Graphiurus microtis griseus* Allen; Mus. Comp. Zool. at Harvard.

[3] Type of *Graphiurus murinus isolatus* Heller; measurements of skull from original description, skull now lost.

Measurements of adult specimens Graphiurus—Continued.

Form and locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, dry.	Skull: Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Interorbital breadth.	Upper tooth row.	Length of mandible.
G. m. isolatus—Contd.											
Mount Umengo..........	182840	Female.	92	82	17.4	23.3	14.3	12.5	4.8	3.6	13.8
Do..................	1[illegible]46	...do.....	98	......	17.7	25.1	15.5	12.9	4.8	3.4	14.7
Do..................	182847	...do.....	90	76	16.7	23.5	15.0	12.8	4.9	3.5	13.7
Mount Kilimanjaro.......	19229/35247	...do.....	98	......	......	25.5	15.2	12.6	4.5	3.3	15.0
G. p. parvus.											
Tana River...............	[1] 36056	Female..	......	......	......	21.0	13.0	11.5	3.7	2.7	11.2
Jambeni Mountains.......	62244	...do.....	......	......	13.9	20.4	12.4	11.4	3.8	2.7	11.4
Engare Ndare River......	182877	...do.....	75	63	13.5	21.2	12.3	11.7	4.0	2.5	11.1
Do..................	182876	...do.....	80	75	13.9	21.4	12.7	11.6	3.9	2.5	12.2
G. p. dollmani.											
Ulukenia Hills............	[2] 16722	...do.....	83	77	14.8	21.8	13.5	12.0	3.9	2.7	12.8
Mount Sagalla............	182879	...do.....	85	80	14.8	22.6	13.3	11.8	4.0	2.8	13.0
Do..................	182880	...do.....	80	75	14.2	21.7	13.2	12.1	4.0	2.8	13.0
G. personatus.											
Rhino Camp, Lado.......	[1] 164867	...do.....	82	63	14.0	21.3	13.2	12.0	4.0	2.7	12.4

[1] Type.

[2] Type; Field Mus. Nat. Hist., Chicago.

Family PEDETIDÆ.

Genus PEDETES Illiger.

1811. *Pedetes* Illiger, Prodr. Syst. Mamm. et Avium, p. 81. (*P. cafer.*)

The East African "jumping hare" is specifically distinct from *Pedetes cafer* of South Africa. The three well-marked forms known from British East Africa are local representatives of one species and all differ from *cafer* by having a very shallow depression in the anterior palatine region of the skull. The forms of this animal are doubtless very local in distribution. They are all very much alike externally, but are easily separated by the characters of the skull.

For measurements of specimens of *Pedetes* see page158.

PEDETES SURDASTER SURDASTER Thomas.

Plates 3, 4, 5.

1902. *Pedetes surdaster* Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 9, p. 440. June. (Morendat, Naivasha Province, British East Africa; type in British Museum.)

1910. *Pedetes surdaster* Roosevelt, African Game Trails, Amer. ed., pp. 473, 479, 486; London ed., pp. 485, 490, 497. (Part; reference to Naivasha specimens.)

Specimens.—Fifty-three, including six odd skulls and seven fetuses, from:

British East Africa: Naivasha Station, 53 (Loring, Mearns, T. Roosevelt.)

The excellent series of 40 perfect skins and skulls of this form well illustrates the uniformity of specimens taken in one vicinity. The type locality of the species, Morendat, is given on the map prepared by the Public Works Department as about 10 miles west of Naivasha Station and these specimens are therefore virtual topotypes and possibly came from the actual type colony. All pregnant females contained a single fetus each.

Loring's interesting notes on this animal, from Appendix C, Roosevelt's African Game Trails, say:

> Very common at Naivasha station where their burrows were numerous on a sandy flat practically in the town, and many were taken within a hundred yards of the station. They are nocturnal, although one instance came under my observation where a springhaas was seen on a dark day to run from one bu row to another. By hunting them on dark nights with the aid of an acetylene light we were able to secure a good series of skins. When the light was flashed on them, their eyes shone like balls of fire the size of a penny, and it was not uncommon to see from two to five and six within the radius of the light at one time. They were usually flashed at a distance of about a hundred yards, and as the light drew near they would watch it, frequently bobbing up and down. Often they hopped away to right or to left, but very seldom did their fright carry them into their burrows unless a shot was fired; in fact even then we sometimes followed up one of their companions and secured it. Some allowed us to approach within 10 feet before moving, and then off they would go in great bounds, but I was never able in the dim light to see whether or not their tails aided them in jumping. I once shot a fox [*Otocyon*] from a cluster of eyes that I am positive were those of springhaas; this together with the fact that the stomachs of all the foxes killed contained termites and insects, leads me to believe that these two animals are more or less congenial. Doctor Mearns saw a springhaas sitting with its tail curled around to one side of its body, similar to the position often assumed by a house cat.

PEDETES SURDASTER CURRAX Hollister.

Plates 39, 40.

1918. *Pedetes surdaster currax* Hollister, Smithsonian Misc. Coll., vol. 68, No 10, p. 3. January 16. (Kabalolot Hill, Sotik, British East Africa; type in U. S. Nat Mus.)

Specimen.—One, the type—

British East Africa: Kabalolot Hill (Heller).

This is a pale form of *surdaster* with a long tail and with a greater mastoid development in the skull than is found in the other East African races of the "jumping hare." The single specimen was collected by the Rainey Expedition in 1911.

PEDETES SURDASTER LARVALIS Hollister.

Plates 3, 4, 5.

1910. *Pedetes surdaster* Roosevelt, African Game Trails, Amer. ed., p. 486; London ed., p. 497. (Part; reference to Ulukenia Hills.)

1918. *Pedetes surdaster larvalis* Hollister, Smithsonian M·sc. Coll. vol. 68, No. 10, p. 2. January 16. (Ulukenia Hills, Athi Plains, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Six, from localities as follows:

British East Africa: Nairobi, 1 skull (Mearns); Ulukenia Hills, 5, including 2 fetuses (Loring).

Although skins of this race are only very slightly paler than skins of true *surdaster* from Naivasha, the skulls are readily distinguished by constant characters. A profile view of the skull presents an evenly rounded outline from the mastoids to the nasals; whereas in the Naivasha form the braincase is much higher and the depression in the frontals much lower so that the upper outline in profile presents a very uneven line, much raised posteriorly and with a decided depression over the lachrymal region. The rostral and orbital regions of the skull are much deeper in the Athi Plains form than in typical *surdaster* from Naivasha; and the suture between the frontals and parietals is almost straight across the skull with only a slight anteriorly rounded convexity, while in the large series of nearly 50 skulls of typical *surdaster* this suture presents a distinct and usually sharply pointed salient into the frontals.

Measurements of East African specimens of Pedetes.

Locality.	No.	Sex.	Head and body.	Tail vertebræ.	Hind foot, with claws.	Skull: Condylobasal length.[1]	Zygomatic breadth.	Greatest breadth of nasals.	Height of skull in front of orbits.[2]	Mastoid breadth.	Upper tooth row, crowns.
P. s. surdaster.											
Naivasha Station	162178	Male	395	428	151	72.7	53.7	19.9	32.3	42.5	15.7
Do	162187	...do	400	430	147	73.5	53.7	20.0	32.3	43.6	14.6
Do	162188	...do	385	430	150	74.9	52.0	19.2	32.2	43.0	14.9
Do	162193	...do	395	405	154	74.5	54.5	20.8	32.7	44.4	14.9
Do	162198	...do	385	430	150	72.4	55.1	21.3	32.3	43.4	15.2
Do	162199	...do	396	444	152	72.4	56.5	20.3	33.0	43.8	15.6
Do	162200	...do	380	435	153	72.1	54.0	20.7	32.1	43.7	15.2
Do	162202	...do	400	430	159	74.3	54.6	21.7	33.1	44.7	14.4
Do	162203	...do	393	430	154	73.9	54.8	19.8	32.5	43.7	15.9
Do	162207	...do	407	430	151	74.9	56.5	19.5	32.5	42.7	14.9
Do	162167	Female	390	420	145	72.3	52.8	19.7	31.2	43.2	14.9
Do	162169	...do	395	425	155	73.3	55.0	20.3	31.7	42.5	15.3
Do	162170	...do	390	400	152	73.1	55.9	19.3	30.5	41.9	15.8
Do	162175	...do	382	405	149	70.4	54.0	20.0	31.1	42.2	15.6
Do	162182	...do	390	425	153	73.5	56.8	19.9	31.4	43.5	15.8
Do	162190	...do	400	......	152	71.7	55.0	20.0	31.6	42.5	15.1
Do	162192	...do	395	405	448	71.9	52.8	19.7	31.7	41.9	15.2
Do	162194	...do	380	395	148	73.6	52.9	19.7	32.4	42.1	15.6
Do	162204	...do	390	430	153	73.0	54.2	19.4	31.6	42.8	15.2
P. s. currax.											
Kabalolot Hill	[3] 181762	Male	400	480	157	75.3	55.7	19.0	33.6	46.1	15.9
P. s. larvalis.											
Ulukenia Hills	163303	Female	353	392	151	72.4	53.8	19.5	34.2	45.4	15.1
Do	[3] 163304	...do	370	427	159	78.2	55.2	21.7	36.2	45.4	16.3
Do	• 163915	...do	383	451	157	76.2	52.3	20.1	34.8	45.1	16.1

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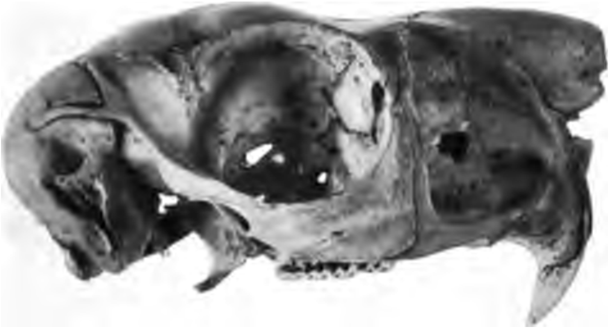
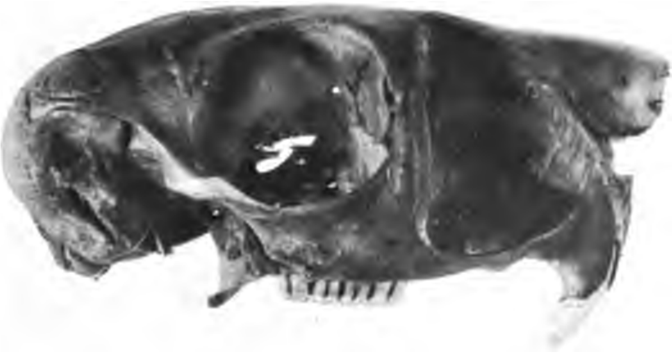
[1] Taken in this case to the most anterior point of premaxillary bone.

[2] From median anterior alveolar line to highest point on crown directly above lachrymal bone.

[3] Type.



PEDETES SURDASTER SURDASTER THOMAS.



PEDETES SURDASTER LARVALIS HOLLISTER. TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 171.

Family BATHYERGIDÆ.

Genus HETEROCEPHALUS Rüppell.

1842. *Heterocephalus* RÜPPELL, Mus. Senckenberg, vol. 3, Heft 2, p. 99. (*H. glaber.*)

In addition to the species of the naked mole-rat known from Somaliland and Abyssinia, three forms have been described from British East Africa. These species or subspecies have been based on single specimens or very small series. After study of a suite of twelve specimens from one general region—the Northern Guaso Nyiro—I find that the characters used to separate these forms from *Heterocephalus glaber* are all accounted for by individual variation. Skulls of *Heterocephalus* are subject to a remarkable amount of variation. (See pls. 6 and 7) In the series of specimens mentioned the differences in size (usually accounted for by age); the variations in the form and position of the posterior border of the bony palate, in the shape, size, and relative position of the palatine foramina, and in the development of the coronoid process are great, and cover virtually all of the conditions described of the type-specimens of the named forms from British East Africa. Remarkable variations in relative size and shape of the molariform teeth are apparent in every specimen, and as great variation is present in width and bulk of the incisors. One skull in the collection, from Archer's Post on the Northern Guaso Nyiro, agrees almost to the slightest detail in every measurement but one with the type skull of *glaber* as described by Thomas.[1] The single case of discrepancy in size is in the breadth of palate inside m^2 and there is every reason to suspect that a mistake has been made in recording that measurement in Mr. Thomas's account. Without a suitable series of authentic skulls of *glaber* it will of course be impossible to settle the matter but it seems best to disregard the names applied to specimens from northern British East Africa until such actual comparison can be made. The type localities of the three names in question are sufficiently close together so that, considering the uniform conditions of local environment necessary to the life of the animal, it is reasonable to suspect that only one form is represented. Mr. Heller compared this series of skulls with the material in London and has noted on the label of one of the larger specimens (No. 184171) that it is identical with skulls of *glaber* from Somaliland; and on the label of one of the smaller skulls (No. 184176) that this specimen is identical with the type skull of *ansorgei*. Rüppell's figure of the type skull of *glaber* and the outline drawing of the same specimen published by Thomas in 1885[2] do not agree in essential details, and it is probably safest not to trust either for fine specific comparisons.

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[1] Proc. Zool. Soc. London, 1885, p. 848.

[2] Proc. Zool. Soc. London, 1885, pl. 54, fig. 5.

HETEROCEPHALUS GLABER Rüppell.

Plates 6, 7.

1842. *Heterocephalus glaber* Rüppell, Mus. Senckenberg, vol. 3, Heft 2, p. 99. (Schoa, Abyssinia; type in Senckenberg Museum, Frankfort.)

1903. *Heterocephalus ansorgei* Thomas, Proc. Zool. Soc. London, 1903, vol. 2, p. 336. (Between Ngomeni and Kenani, British East Africa; type in British Museum.)

1912. *Heterocephalus stygius* G. M. Allen, Bull. Mus. Comp. Zool., vol. 54, p. 444. April. (Neuman's Boma, Northern Guaso Nyiro, British East Africa; type in Mus. Comparative Zoölogy, Harvard University.)

1912. *Heterocephalus glaber progrediens* Lönnberg, Kungl. Sv. Vet. Akad. Handl., vol. 48, No. 5, p. 102. (Thornbush country north of Northern Guaso Nyiro, British East Africa; type in R. Nat. Hist. Mus., Stockholm.)

Specimens.—Thirteen, from localities as follows:

Italian Somali: Lugh, 1 in alcohol (Bottego).

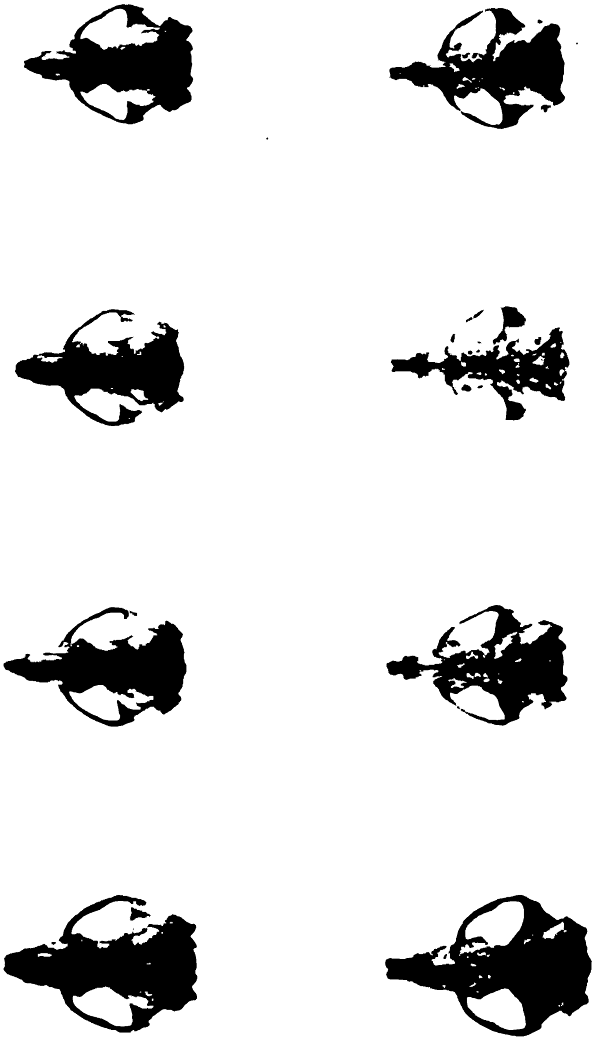
British East Africa: Archer's Post, 3 (Heller); Lakiundu River, 1 (Heller); Longaya Water, Marsabit Road, 1 (Heller); Merelle Water, Marsabit Road, 6, including 4 in alcohol (Heller); Northern Guaso Nyiro River, 30 miles east of falls, 1 (Percival).

In Heller's field journal of the Rainey Expedition I find the following interesting notes on naked rats:

> Longaya Water: This morning near camp I saw several of the *Heterocephalus* throwing dirt out of their burrows. Little puffs of sand were coming out at intervals. The animal could not be seen and was apparently below the mouth of the burrow. This was about 8 a. m., and at 9 a. m. I again went out to snare some, but found them all quiet. They are apparently active only in the early morning. At sundown more were seen working. Went out at 9 p. m. with the headlight but found none at work where holes were numerous. Caught one during the night in a trap. Merelle Water: At 5 p. m. I saw several *Heterocephalus* throwing sand out of the burrows. I stood over one of the holes and watched. The animal pushed the dirt to the entrance with his head, then turned about and with his hind feet threw the dirt out, in a rapid puffy fashion, vertically, so that in falling it made a funnel-shaped pile about the hole. While he was thus throwing out the earth his tail could be seen wagging back and forth. Archer's post: As we were approaching camp I saw one of the naked mole rats throwing out sand in the bright sunshine. They seem [after all] to have no definite time for work.

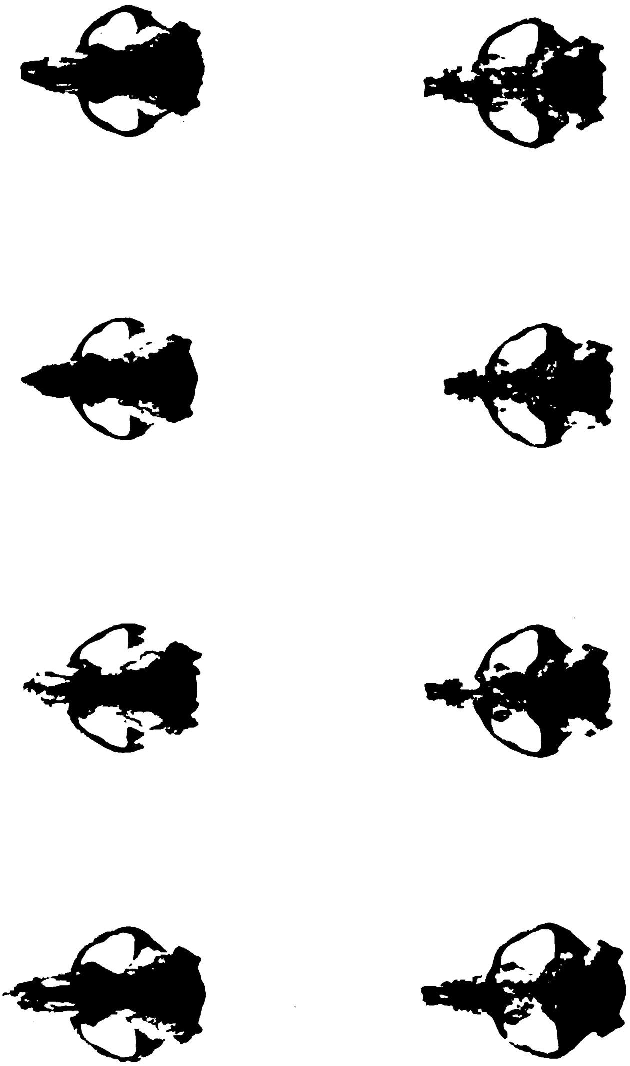
Measurements of specimens of Heterocephalus glaber from British East Africa.

Locality.	No.	Sex.	Head and body.	Tail.	Hind foot.	Skull: Occipitonasal length.	Condylobasal length.	Zygomatic breadth.	Mastoid breadth.	Upper tooth row, crowns.	Mandible.	Lower tooth row, crowns.
Archer's post......	184171	Male....	108	46	21	21.5	24.2	18.2	13.1	3.3	20.4	3.4
Do............	184172	...do....	98	46	21	20.2	22.4	15.7	12.5	3.2	18.4	3.6
Do............	184177	Female .	100	47	21	19.9	22.4	17.2	12.7	3.5	18.8	4.0
North Guaso Nyiro.	184170	...do....	98	50	19	20.9	23.7	17.8	12.9	3.2	20.3	3.6
Lakiundu River...	184173	Male....	90	43	20	19.0	20.3	15.6	12.2	3.3	17.4	3.9
Longaya Water....	184174	...do....	95	43	19	18.9	21.2	16.0	12.6	3.3	17.4	3.7
Merelle Water......	184175	Female .	105	50	22	20.3	22.7	17.4	12.5	3.2	19.4	3.6
Do............	184176	...do....	95	50	21	19.4	21.5	16.2	11.9	3.4	18.2	3.9



SKULLS OF HETEROCEPHALUS GLABER, ADULT MALES.

FOR EXPLANATION OF PLATE SEE PAGE 171.



SKULLS OF HETEROCEPHALUS GLABER, ADULT FEMALES.

FOR EXPLANATION OF PLATE SEE PAGE 171.

Genus HELIOPHOBIUS Peters.

1846. *Heliophobius* PETERS, Mon.-ber. Akad. Berlin, 1846, p. 259. (*H. argenteocinereus.*)

1890. *Myoscalops* THOMAS, Proc. Zool. Soc. London, p. 448. (To replace *Heliophobius* on supposition that it was preoccupied by *Heliophobus* Boisduval, 1829.)

The blesmols of this genus are in need of a careful systematic revision. For the present it seems best to use for our specimens the name proposed by Heller for the Kapiti Plains species. Although this name may be antedated by others, at present of doubtful status, it unquestionably applies to the form, and should not be replaced without due consideration.

HELIOPHOBIUS KAPITI (Heller).

Plate 38.

1909. *Georychus kapiti* HELLER, Smithsonian Misc. Coll., vol. 54, part 4, p. 469. September 24. (Potha, Kapiti Plains, British East Africa; type in U. S. Nat. Mus.)

1910. *Myoscalops kapiti* ROOSEVELT, African Game Trails, Amer. ed., pp. 473, 479, 486; London ed., pp. 485, 490, 497.

Specimens.—Forty-three, from localities as follows:

BRITISH EAST AFRICA: Kapiti Plains, 8 (Loring); Kiambu, 1 (Loring); Loita Plains, 19 (Heller); Narosurra River, 2 (Turner); Southern Guaso Nyiro River, 3 (Loring); Telek River, 5 (Heller); Tsavo, 1 (Turner); Ulukenia Hills, 4 (Loring).

All of the specimens of *Heliophobius* from British East Africa in the United States National Museum collection appear to belong to a single form. The skin and skull from Tsavo are indistinguishable from specimens from Kapiti Plains and other localities and do not approach in any manner *Heliophobius spalax*[1] of Taveta. A single skin in the series (No. 181638 from Loita Plains) has a white nose; otherwise all are without abnormal markings of any kind.

The status of two forms of *Heliophobius* described from "East Africa" by Gray in 1864[2] has never been settled. These were based on specimens collected by Speke, the types of which are in the British Museum. One, *H. albifrons*, has a large white frontal spot; the other, *H. pallidus*, is of a peculiar pale and possibly albinistic color.[3]

On the Loita Plains, May 26, Heller found female blesmols with two and three embryos each. The members of the Smithsonian African Expedition found numerous skulls of *Heliophobius* in owl pellets on the Kapiti Plains.

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[1] Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 6, p. 315. September, 1910.

[2] Proc. Zool. Soc. London, 1864, pp. 123, 124.

[3] Thomas, Ann. and Mag. Nat. Hist., ser. 8, vol. 6, p. 316. September, 1910.

Family HYSTRICIDÆ.

Genus HYSTRIX Linnæus.

1758. *Hystrix* Linnæus, Syst. Nat., ed. 10, vol. 1, p. 56. (*H. cristata.*)

In addition to the porcupine from Lamu, British East Africa, included in our collection and listed below, the following forms have recently been described from eastern Equatorial Africa: *Hystrix galeata ambigua* Lönnberg,[1] Kibonoto, Kilimanjaro; *Hystrix africæ-australis prittwitzi* Müller,[2] Tabora, south of Victoria Nyanza, German East Africa; *Hystrix galeata conradsi* Müller,[3] Muansa, south shore of Victoria Nyanza, German East Africa; *Hystrix galeata lademanni* Müller,[3] Kondoa Irangi, German East Africa; *Hystrix galeata lönnbergi* Müller,[4] Mount Kilimanjaro; *Hystrix stegmanni* Müller,[5] Kissenji, northeast of Lake Kivu, German East Africa; and *Hystrix galeata somalensis* Lönnberg,[6] near Njoro, north of Northern Guaso Nyiro River, British East Africa. Dollman has recorded *Hystrix africæ-australis* Peters from the Amala River, southwestern British East Africa.[7]

HYSTRIX GALEATA Thomas.

1893. *Hystrix galeata* Thomas, Ann. and Mag. Nat. Hist., ser. 6, vol. 11, p. 230. March. (Lamu, British East Africa; type in British Museum.)

1910. *Hystrix galeata* Roosevelt, African Game Trails, Amer. ed., pp. 473, 479; London ed., pp. 485, 491.

Specimens.—Three, from localities as follows:

British East Africa: Lake Naivasha, 2 (K. Roosevelt); Maji-ya-chumvi, 1 (Heller).

Some quills of the porcupine, picked up by Doctor Mearns at 6,500 feet on the west side of Mount Kenia, are also in the collection. The Maji-ya-chumvi specimen, which might be taken as representing true *galeata*, is young, with only two cheek teeth in place. One of the Naivasha specimens is somewhat older, with three cheek teeth, but with the premolar unchanged and with the basal suture open; while the other Naivasha skull shows the specimen to be an old, but not aged, individual. All are males. The skulls of these three animals are therefore not fairly comparable, but there is no reason to suspect that the Naivasha specimens might represent a separate race. Skins and quill markings of the two younger specimens are very much alike.

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[1] Sjostedts Kilimandjaro-Meru Exped., Mamm., p. 29. 1908.

[2] Sitz.-ber. Ges. nat. Freunde Berlin, 1910, p. 311.

[3] Sitz.-ber. Ges. nat. Freunde Berlin, 1910, p. 314.

[4] Sitz.-ber. Ges. nat. Freunde Berlin, 1910, p. 315.

[5] Archiv. für Naturgesch., 1910, vol. 1, p. 186.

[6] Kungl. Svenska Vet. Handl., vol. 48, No. 5, p. 109. 1912.

[7] Proc. Zool. Soc. London, 1914, p. 317.

Family THRYONOMYIDÆ.

Genus THRYONOMYS Fitzinger.

1827. *Aulacodus* Temminck, Mon. Mamm., vol. 1, p. 245. (*T. swinderianus.* Not *Aulacodus* Eschscholtz, 1822.)

1867. *Thryonomys* Fitzinger, Sitz.-ber. Akad. Wien, vol. 56, p. 141. (*T. semipalmatus.*)

1896. *Triaulacodus* Lydekker, Geogr. Hist. Mamm. pp. 91, 240 (pro *Aulacodus* Temminck).

Representatives of both the large and small cane rats of this genus are included in the collection; but the material is altogether inadequate, and no opinion can be ventured on the relationships of the forms or on their systematic value.

THRYONOMYS SWINDERIANUS (Temminck).

1827. *Aulacodus swinderianus* Temminck Mon. Mamm., vol. 1, p. 248. (Africa; type in Leyden Museum.)

1892. *Aulacodus swinderianus* True, Proc. U. S. Nat. Mus., vol. 15, p. 468.

Specimen.—One skin and skull, as follows:

British East Africa: Taveta, 1 (Abbott).

The skull of this specimen, and old adult, basal suture obliterated, sex unknown, measures: Greatest length, 104 millimeters; condylobasal length, 91. 2; zygomatic breadth, 70.3; greatest width of rostrum, 29.7; greatest width of nasals, 20.4; greatest length of nasals, 35.5; upper tooth row, crowns, 19.2.

THRYONOMYS PUSILLUS Heller.

Plate 41.

1912. *Thryonomys gregorianus pusillus* Heller, Smithsonian Misc. Coll., vol. 59, No. 16, p. 17. July 5. (Ndi, Taita Hills, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Seven, from localities as follows:

British East Africa: Maji-ya-chumvi, 5, including 3 embryos in alcohol (Heller); Ndi, 2, including 1 odd skull (Heller).

Females from Ndi, November 3, and Maji-ya-chumvi, December 12, each contained three embryos. A small specimen, about the size of a house rat, was captured at the latter place on December 10. Heller's field notes say that the species lives in grassy veldt, in holes; and on the edges of scrub thickets. Measurements of the type skull (young adult female with basal suture open) and of a similar female from Maji-ya-chumvi: Greatest length, 71.7, —; condylobasal length, 65.8, —; zygomatic breadth, 43. 7, —; greatest width of rostrum, 17.3, 16.9; greatest width of nasals, 11.8, 11.9; greatest length of nasals, 23.6, 24.8; mandible, 50.3, 52.5; upper tooth row, crowns, 14.9, 14.2.

THRYONOMYS GREGORIANUS (Thomas).

1894. *Aulacodus gregorianus* THOMAS, Ann. and Mag. Nat. Hist., ser. 6, vol. 13 p. 202. February. (Luiji Reru River, Konu, Kikuyu British East Africa; type in British Mus.)

Specimen.—One skin and skull, as follows:

BRITISH EAST AFRICA: Kaimosi, 1 (Turner).

Mr. Turner has noted on the label that this specimen was captured on a grassy hill near Kaimosi, December 10, 1913.

Order LAGOMORPHA.

Family LEPORIDÆ.

Genus LEPUS Linnæus.

1758. *Lepus* LINNÆUS, Syst. Nat., ed. 10, vol. 1, p. 57. (*L. timidus.*)

The East African hares are readily separated into several well-marked forms. In no case does our material show two forms occupying the same territory and it would seem probable that complete collections will prove that all the British East African hares, with the exception of *L. raineyi*, are races of some earlier named species, probably of *Lepus capensis*.

LEPUS ISABELLINUS Cretzschmar.

1828. *Lepus isabellinus* CRETZSCHMAR, Atlas Reise nörd. Afrika von Eduard Rüppell, p. 52. (Desert southwest from Ambukol, Sudan; type in Frankfort Museum.)

1905. *Lepus isabellinus* SCHWANN, Novit. Zool., vol. 12, p. 5. January.

Specimens.—Two, from—

SUDAN: Naikhala (Rothschild).

LEPUS TIGRENSIS Blanford.

1869. *Lepus tigrensis* BLANFORD, Ann. and Mag. Nat. Hist., ser. 4, vol. 4, p. 330. November. (Takonda and Adabagi, Abyssinia; "types in British Museum.")[1]

Specimens.—Two, from—

ERITREA: Agordat (received from W. F. H. Rosenberg).

LEPUS RAINEYI Heller.

Plate 42.

1912. *Lepus raineyi* HELLER, Smithsonian Misc. Coll., vol. 59, No. 16, p. 18. July 5. (Longaya Water, 30 miles south of Mount Marsabit, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Eight, from localities as follows:

BRITISH EAST AFRICA: Kara Water, Marsabit Road, 1 (Heller); Lakiundu River, 3 (Heller); Longaya Water, Marsabit Road, 1 (Heller); Marsabit Road, 1 (Heller); Mount Lololokwi, 1 (Heller); Quoy Water, Marsabit Road, 1 (Heller).

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[1] Blanford, Observations on the Geology and Zoology of Abyssinia, p. 276. London, 1870.

This long-eared, buff and black hare, with a distinct grayish rump patch, is readily distinguishable from the hares of the *capensis-victoriæ* group. It is confined to the region north of Mount Kenia, where it is known from the southern side of the Northern Guaso Nyiro River northward to Mount Marsabit. Heller found single embryos in females from Lakiundu River, July 10, and Longaya Water, July 21.

Heller reports this hare as abundant in the open sandy desert country about Marsabit. He says it relies upon its pale coloration, rather than cover, for protection, differing in this respect from the hares of the highlands of British East Africa to the southward.

LEPUS CAPENSIS ABBOTTI Hollister.

Plate 43.

1892. ?*Lepus capensis* True, Proc. U. S. Nat. Mus., vol. 15, p. 468. (Not of Linnæus.)

1918. *Lepus capensis abbotti* Hollister, Proc. Biol. Soc. Washington, vol. 31, p. 35. May 16. (Plains east of Mount Kilimanjaro, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Three, from localities as follows:

British East Africa: Maji-ya-chumvi, 1 (Heller); plains east of Mount Kilimanjaro, 1 (Abbott); Useri River, 1 (Abbott).

This subspecies of the Cape hare more nearly resembles the typical form of South Africa than do some of the intermediate races. It is closely related to *Lepus capensis crawshayi*, but can be distinguished in fresh pelage by the more ochraceous tone of the buff hair rings above; more ochraceous, less blackish, shoulders and sides of neck; deeper ochraceous nape-patch, throat-patch, sides, and limbs; and browner ears. The young example from Maji-ya-chumvi, in juvenile coat, is decidedly darker (more ochraceous, less gray) than young of *crawshayi* in corresponding pelage, and has a much deeper colored nape and throat.

LEPUS CAPENSIS CRAWSHAYI de Winton.

1899. *Lepus crawshayi* de Winton, Proc. Zool. Soc. London, p. 416. (Neugia Kitwi,[1] British East Africa; type in British Museum.)

1910. *Lepus victoriæ* Roosevelt, African Game Trails, Amer. ed., pp. 473, 479; London ed., pp. 485, 491. (Part.)

1918. *Lepus capensis crawshayi* Hollister, Proc. Biol. Soc. Washington, vol. 31, p. 35. May 16.

Specimens.—Twenty-eight, from localities as follows:

British East Africa: Juja Farm, 1 (Mearns); Kapiti Plains, 7 (Mearns, Loring); Naivasha Station, 1 (Loring); Omboni River, 1 (Heller); Plains west of Mount Kenia, 8, including 1 in alcohol (Loring, Mearns); Sir Alfred Pease's Farm, 1 (Mearns); Ulukenia Hills, 9, including 2 in alcohol and 2 odd skulls (Loring, Mearns).

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[1] East of the Athi River and northeast of Machakos.

Measurements of specimens of Lepus.

Form and locality.	No.	Sex.	Head and body.	Tail.	Hind foot.	Ear from notch, dry.	Skull: Occipitonasal length.	Condylobasal length.	Zygomatic breadth.	Interorbital constriction.	Postorbital constriction.	Breadth of braincase.	Length of nasals (diagonal).	Greatest breadth of nasals.	Maxillary tooth row, alveoli.	Mandibular tooth row, alveoli.
L. isabellinus.																
Sudan:																
Naikhala	141512	Male	425	90	102	110	....	....	....	....	....	....	....	....	....	....
Do	141511	Female	420	90	100	99	....	....	....	....	....	....	....	....	....	....
L. tigrensis.																
Eritrea:																
Agordat	122538	....	....	....	....	122	85.8	75.8	38.2	17.7	11.3	27.8	36.0	18.2	15.3	15.5
Do	122539	....	....	....	....	112	81.0	72.4	....	17.4	11.2	27.1	34.7	19.6	14.8	15.7
L. raineyi.																
B. E. A.:																
Marsabit Road	182746	Female	460	98	115	113	88.2	79.5	39.9	15.4	12.3	29.0	36.6	19.6	15.8	15.8
Longaya Water	[1] 181808	...do...	480	95	105	114	87.0	77.8	41.8	18.7	10.5	28.9	36.7	19.4	15.2	15.4
Kara Water	182745	...do...	470	134	115	107	87.0	79.2	39.8	19.3	12.3	29.6	37.7	20.9	15.4	16.4
Quoy Water	182747	...do...	460	103	110	108	87.0	77.9	41.6	19.3	14.1	28.8	37.8	21.8	15.3	16.3
Lakiundu River	182742	Male	450	100	105	113	86.1	75.8	39.3	16.1	13.0	28.3	36.8	20.0	15.1	15.8
Do	182744	...do...	450	106	108	111	82.7	75.0	39.2	15.3	10.9	28.1	36.2	19.3	13.7	14.8
Do	182743	Female	460	80	105	97	85.8	76.4	39.2	17.8	12.9	28.3	36.8	19.9	15.1	15.6
L. c. abbotti.																
Kilimanjaro Plains	19013	Male	....	....	....	84	86.2	77.3	39.3	18.3	13.0	27.2	38.8	19.7	15.2	16.3
Do	[1] 19014	Female	....	....	....	82	87.5	76.9	40.5	15.9	10.3	28.7	38.8	19.7	15.3	16.1
L. c. crawshayi.																
B. E. A.:																
Mount Kenia	163668	Male	425	112	119	88	81.3	73.2	39.9	16.3	12.7	28.8	33.7	19.0	14.1	15.0
Do	163669	...do...	435	95	103	86	80.5	71.3	38.2	15.3	12.9	27.8	34.0	18.5	14.3	15.1
Do	163672	...do...	411	91	110	87	82.2	73.7	40.5	17.1	11.2	30.0	34.3	19.3	14.8	15.3

Do	163673	...do....	451	73	113	88	87.0	78.0	41.4	17.5	12.6	30.0	35.4	18.7	14.7	15.6
Do	163671	Female	426	89	116	93	84.8	75.0	40.2	17.5	11.5	28.5	36.2	20.2	14.0	15.4
Omboni River	163667	...do....	450	105	118	88	83.0	72.0	39.9	15.5	11.5	28.7	34.7	17.5	14.2	14.8
Naivasha	162160	...do....	455	105	114	94	....	....	40.9	16.8	12.3	....	35.3	17.8	15.0	15.8
Juja Farm	161703	Male....	460	95	117	91	81.8	75.0	39.0	17.8	11.2	28.3	35.3	18.5	13.9	14.9
Ulukenia Hills	163662	...do....	420	91	115	85	83.8	75.2	40.1	21.1	12.7	28.5	34.7	20.7	15.2	16.1
Do	163666	...do....	442	82	109	86	81.3	72.9	39.9	16.0	12.7	30.3	34.6	20.3	14.8	16.3
Do	163663	Female	424	95	110	98	81.6	73.8	39.8	14.8	12.2	29.0	33.1	18.4	15.0	15.8
Do	163665	...do....	423	102	111	89	84.6	75.2	40.3	17.4	11.8	28.6	35.2	18.8	15.2	16.7
Kitanga	161702	...do....	435	102	114	85	86.3	76.0	37.7	18.3	9.9	28.4	37.9	19.8	14.9	16.7
Kapiti Plains	162158	Male....	....	....	....	93	82.0	75.2	39.9	17.6	12.7	28.5	34.7	18.5	14.4	15.0
Do	162159	...do....	....	....	....	99	78.7	72.9	39.7	15.2	11.3	28.4	31.8	17.3	14.0	14.6
Do	162150	Female	....	....	....	98	81.8	75.0	38.5	15.8	10.8	27.4	33.5	17.5	14.0	15.3
Do	162151	...do....	....	....	....	95	82.3	73.8	41.2	15.5	11.1	29.2	33.9	18.1	14.7	15.2
Do	162157	...do....	470	92	112	92	87.1	78.3	39.4	15.9	11.2	29.2	35.8	18.0	15.3	16.3
L. v. victoriæ.																
B. E. A.:																
Telek River	181766	Male....	580	70	110	86	86.5	....	42.9	19.4	12.8	30.5	38.0	20.0	15.6	17.0
Southern Guaso Nyiro	162156	...do....	455	105	116	92	....	75.1	39.9	17.4	11.9	28.0	36.7	....	14.4	15.3
Do	162161	...do....	500	114	120	100	85.5	77.0	40.9	15.0	11.7	28.8	36.7	18.9	15.2	16.2
Do	162153	Female	449	106	120	94	88.1	78.8	43.0	16.6	14.1	30.2	40.4	18.7	15.3	15.8
Do	162154	...do....	428	90	112	96	84.0	75.9	42.0	16.2	12.8	29.8	33.1	18.1	15.2	15.5
Do	162155	...do....	453	101	124	92	....	73.2	40.4	17.0	12.4	29.2	....	19.1	14.7	16.0
Do	162162	...do....	465	130	122	94	78.6	71.6	38.8	16.0	12.2	27.9	33.0	16.2	13.7	15.1
Do	162163	...do....	520	135	120	94	93.2	83.0	42.9	18.8	12.0	30.7	41.2	21.8	16.8	17.2
L. v. kakumegæ.																
B. E. A.:																
Lukosa River	[1] 181809	Female	460	110	105	78	89.5	80.0	41.1	19.0	11.5	29.1	39.2	18.7	15.5	17.0
Sirgoit Lake	163661	...do....	490	95	115	83	88.7	79.4	39.3	16.2	12.1	29.2	39.0	17.8	16.2	16.8
L. microtis.																
Uganda: Ledgus	164841	....	....	....	....	81	86.8	76.0	38.5	18.1	12.0	26.9	39.3	20.4	16.2	17.3

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[1] Type

Mearns notes one small fetus in a female collected at Sir Alfred Pease's Farm, May 9.

In full, fresh pelage this is a richly colored hare, much darker than *raineyi* or *victoriæ*, and less rufous or ochraceous than *abbotti* or *kakumegæ*. Only a few skins are in the best pelage, the majority of the specimens showing considerably the effects of wear and fading. Specimens in juvenile coat are pale brownish gray, but those in the post-juvenile pelage are darker than many adults. As with most hares, these latter may be distinguished from the adults by the peculiar fine streaking of the post-juvenile coat. Some adults, in old pelage but not yet showing much wear, are very gray in color, differing markedly from the darker, fresh-coated animals. There is great uniformity in the skulls throughout the entire series, and I do not detect any subspecific differences between skins from the extremes of distribution for the race. No evidences of direct intergradation with *L. victoriæ* or with *L. raineyi* are to be found from our material. Contrary to the general opinion, I do not think that the ranges of these species overlap, and I would not be surprised if *victoriæ* eventually proved to be a subspecies of *Lepus capensis*, grading into *crawshayi* or *abbotti*.

LEPUS VICTORIÆ VICTORIÆ Thomas.

1893. *Lepus victoriæ* Thomas, Ann. and Mag. Nat. Hist., ser. 6, vol. 12, p. 268. October. (Nassa, Speke Gulf, Victoria Nyanza, German East Africa; type in British Museum.)

1910. *Lepus victoriæ* Roosevelt, African Game Trails, Amer. ed., pp. 473, 479; London ed., pp. 485, 491. (Part.)

Specimens.—Fourteen, from localities as follows:

British East Africa: Deep Dale, Sotik, 1 (Heller); Kabalolot Hill, 2 (Heller); Oljoro O Nyon River, 1 (Loring); Southern Guaso Nyiro River, 9, including 1 odd skull (Loring, Mearns, Heller); Telek River, Sotik, 1 (Heller).

This is a distinctly larger hare than *Lepus capensis crawshayi*. It does not, so far as our material shows, range east of the Rift Valley. I suspect that it is a subspecies of *Lepus capensis* and that intergrading specimens will be found between it and *crawshayi* or *abbotti*. The characters of the incisor teeth, commonly used to distinguish *victoriæ* from *crawshayi*,[1] are average only, and are not to be relied upon in every case. Compared with *Lepus capensis crawshayi*, the Victoria hare is a much less brightly colored animal, less gray or less blackish according to the condition of the pelage. Our specimens are a very uniformly colored lot, but there is considerable variation in size of the skull. As usual in the genus the largest specimens are old females.

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[1] See de Winton, Proc. Zool. Soc. London, 1899, pp. 416, 417; Lönnberg, Kungl. Sv. Vet. Akad. Handl. vol. 48, No. 5, p. 111. 1912.

LEPUS VICTORIÆ KAKUMEGÆ Heller.

Plate 44

1910. *Lepus victoriæ* ROOSEVELT, African Game Trails, Amer. ed., pp. 473, 479; London ed., pp. 485, 491. (Part.)

1912. *Lepus kakumegæ* HELLER, Smithsonian Misc. Coll., vol. 59, No. 16, p. 19. July 5. (Lukosa River, Kakumega Forest, British East Africa; type in U. S. Nat. Mus.)

Specimens.—Four, from localities as follows:

BRITISH EAST AFRICA: Guas Ngishu Plateau, 1 odd skull (Heller); Lukosa River, 1 (Heller); Sirgoit Lake, 2, including 1 odd skull (Heller).

A dark, or rather more richly colored race of *Lepus victoriæ*, with much shorter ears. The Sirgoit Lake skin is somewhat intermediate between this form and typical *victoriæ*, but clearly goes best with *kakumegæ*. This is probably a connectant subspecies between *victoriæ* and *microtis*. Hares from Uganda and the upper Nile are greatly needed in collections.

LEPUS MICROTIS Heuglin.

1865. *Lepus microtis* HEUGLIN, Nov. Act. Acad. Caes. Leop., vol. 32, pt. 1, p. 32. (Lat. 6°–8° N., long. 29°–31° E., Bahr-el-Gazal, Sudan.)

Specimen.—One head with skull from—

UGANDA: Lagos, near Ledgus, 1 (Loring).

The status of *Lepus microtis* Heuglin has never been determined, but there seems little reason to suspect that it represents anything except the short-eared forest hare of the upper Nile, which doubtless intergrades through *kakumegæ* into *Lepus victoriæ*. The single specimen in the collection, imperfect as it is, helps little to settle the question except that it proves the presence of a hare of this type in extreme northwestern Uganda. The Ledgus specimen may not represent typical *microtis*, but the form represented will doubtless prove nearer to that subspecies than to the obviously related *Lepus victoriæ kakumegæ*.

Order TUBULIDENTATA.

Family ORYCTEROPIDÆ.

Genus ORYCTEROPUS Geoffroy.

1796. *Orycteropus* GEOFFROY, Mag. Encycl., vol. 2, p. 290. (*O. afer.*)

The aard-vark is rarely collected by East African travelers, and no specimens were brought home by either of the larger expeditions.

ORYCTEROPUS ÆTHIOPICUS Sundevall.

1843. *Orycteropus æthiopicus* SUNDEVALL, Kongl. Vet.-Akad. Handl., 1842, p. 236. (Sennar, Sudan.)

Specimen.—One skin and skull, as follows:

ABYSSINIA: Adis Ababa, 1 (Philip).

The skull of this specimen measures: Total length, 213; condylobasal length, 213; zygomatic breadth, 79; median length of nasals, 88.4; greatest breadth of nasals, 44; interorbital breadth, 57.4; postorbital constriction, 43.7; palatal length, 132; length of mandible, 186; entire upper tooth row, 65.8; entire lower tooth row, 42.2.

EXPLANATION OF PLATES.

The skulls illustrated in these plates were all photographed natural size. The scale as given is in most cases correct, but allowance should be made for very slight variations from the size of the actual specimens which sometimes exist in plates made by the photographic process.

Plate 1.

Map of Eastern Equatorial Africa.

Plate 2.

East African maned rat (*Lophiomys ibeanus*) photographed from living specimen in the National Zoological Park. (From Baker, Smithsonian Misc. Coll., vol. 59, No. 9, pl. 1, 1912.) Much reduced.

Plate 3.

Skulls of *Pedetes*, lateral view, natural size.

Upper figure. *Pedetes surdaster surdaster*. Adult female; Cat. No. 162170; Naivasha Station, British East Africa.

Lower figure. *Pedetes surdaster larvalis*. Adult female; Cat. No. 163304; Ulukenia Hills, British East Africa. Type-specimen.

Plate 4.

Skulls of *Pedetes*, dorsal view, natural size.

Upper figure. *Pedetes surdaster surdaster*. Adult female; Cat. No. 162170; Naivasha Station, British East Africa.

Lower figure. *Pedetes surdaster larvalis*. Adult female; Cat. No. 163304; Ulukenia Hills, British East Africa. Type-specimen.

Plate 5.

Skulls of *Pedetes*, ventral view, natural size.

Upper figure. *Pedetes surdaster surdaster*. Adult female; Cat. No. 162170; Naivasha Station, British East Africa.

Lower figure. *Pedetes surdaster larvalis*. Adult female; Cat. No. 163304; Ulukenia Hills, British East Africa. Type-specimen.

Plate 6.

Skulls of *Heterocephalus glaber*, adult males, from north of Mount Kenia; dorsal and ventral views, natural size.

Cat. No. 184174.	Longaya Water.
Cat. No. 184173.	Lakiundu River.
Cat. No. 184172.	Archer's Post.
Cat. No. 184171.	Archer's Post.

Plate 7.

Skulls of *Heterocephalus glaber*, adult females, from north of Mount Kenia; dorsal and ventral views, natural size.

Cat. No. 184177.	Archer's Post.
Cat. No. 184176.	Merelle Water.
Cat. No. 184175.	Merelle Water.
Cat. No. 184170.	Northern Guaso Nyiro.

PLATE 8.

Skull of type-specimen of *Sciurus undulatus* True. adult male; Cat. No. 19005. Natural size. (=*Heliosciurus undulatus undulatus*.)

PLATE 9.

Skull of type-specimen of *Heliosciurus rufobrachiatus shindi* Heller. Adult male; Cat. No. 182768. Natural size. (=*Heliosciurus undulatus shindi*.)

PLATE 10.

Skulls of type-specimens (natural size).

Left. *Heliosciurus multicolor madogæ* Heller. Adult male; Cat. No. 164828.

Right. *Paraxerus kahari* HELLER. Adult female; Cat. No. 164203. (=*Paraxerus ochraceus kahari*.)

PLATE 11.

Skull of type-specimen of *Protoxerus stangeri bea* Heller. Adult male; Cat. No. 181786. Natural size.

PLATE 12.

Skulls of type-specimens (natural size).

Left. *Tatera varia* Heller. Adult male; Cat. No. 162249. (=*Tatera böhmi varia*.)

Right. *Tatera pothæ* Heller. Adult female; Cat. No. 161716. (=*Tatera vicina pothæ*.)

(From Smithsonian Misc. Coll., vol. 56, No. 9, pl. 1. 1910.)

PLATE 13.

Skull of type-specimen of *Tatera nigricauda percivali* Heller. Adult female; Cat. No. 183945. Natural size.

PLATE 14.

Skull of type-specimen of *Lophiomys thomasi* Heller. Adult male; Cat. No. 181789. Natural size.

PLATE 15.

Skull of type-specimen of *Tachyoryctes rex* Heller. Adult male; Cat. No. 163088. Natural size. (From Smithsonian Misc. Coll., vol. 56, No. 9, pl. 3. 1910.)

PLATE 16.

Skulls of type-specimens (natural size).

Upper figures. *Dendromus mesomelas percivali* Heller. Adult female; Cat. No. 181791. (=*Dendromus insignis percivali*.)

Middle figures. *Dendromus whytei capitis* Heller. Adult female; Cat. No. 181792.

Lower figures. *Dendromus lineatus* Heller. Adult male; Cat. No. 164816.

PLATE 17.

Skulls of type-specimens (natural size).

Upper figures. *Dendromus nigrifrons* True. Adult female; Cat. No. 35263.

Middle figures. *Dendromus spectabilis* Heller. Adult female; Cat. No. 164815. (=*Dendromus nigrifrons spectabilis*.)

Lower figures. *Steatomys athi* Heller. Adult female; Cat. No. 162883.

PLATE 18.

Skulls of type-specimens (natural size).

Left. *Zelotomys hildegardeæ vinaceus* Heller. Adult female; Cat. No. 181798.

Right. *Thamnomys dolichurus littoralis* Heller. Adult male; Cat. No. 181799. (=*Thamnomys surdaster littoralis*.)

PLATE 19.

Skulls of type-specimens (*natural size*).

Left. *Œnomys hypoxanthus vallicola* Heller. Adult female; Cat. No. 162614. (=*Œnomys bacchante vallicola.*)

Right. *Epimys kaiseri centralis* Heller. Adult male; Cat. No. 165035. (=*Rattus kaiseri helleri* Hollister.)

PLATE 20.

Skulls of type-specimens (*natural size*).

Left. *Thamnomys loringi* Heller. Adult female; Cat. No. 161904. (=*Rattus nigricauda loringi.*)

Right. *Mus peromyscus* Heller. Adult male; Cat. No. 161905. (=*Rattus tullbergi peromyscus.*)

(From Smithsonian Misc. Coll., vol. 52, part 4, pl. 56. 1909.)

PLATE 21.

Skulls of type-specimens (*natural size*).

Upper figures. *Epimys kaiseri turneri* Heller. Adult female; Cat. No. 183395. (=*Rattus kaiseri turneri.*)

Middle figures. *Epimys endorobæ* Heller. Adult male; Cat. No. 162888. (=*Rattus dennisæ.*)

Lower figures. *Epimys taitæ* Heller. Adult male; Cat. No. 181797. (=*Rattus taitæ.*)

PLATE 22.

Skulls of type-specimens (*natural size*).

Upper figures. *Epimys alleni kaimosæ* Heller. Adult female; Cat. No. 181794. (=*Rattus stella kaimosæ.*)

Middle figures. *Epimys niveiventris ulæ* Heller. Adult female; Cat. No. 162887. (=*Rattus fumatus fumatus.*)

Lower figures. *Mus tana* True. Adult female; Cat. No. 36055. (=*Rattus tana.*)

PLATE 23.

Skulls of type-specimens (*natural size*).

Upper figures. *Epimys coucha ismailiæ* Heller. Adult male; Cat. No. 165108. (=*Rattus coucha ismailiæ.*)

Middle figures. *Rattus coucha tinctus* Hollister. Adult male; Cat. No. 183294.

Lower figures. *Epimys coucha neumani* Heller. Adult male; Cat. No. 181795. (=*Rattus coucha neumani.*)

PLATE 24.

Skulls of type-specimens (*natural size*).

Upper figures. *Leggada naivashæ* Heller. Adult male; Cat. No. 162885. (=*Mus triton triton.*)

Middle figures. *Epimys panya* Heller. Adult male; Cat. No. 161886. (=*Rattus coucha panya.*)

Lower figures. *Epimys coucha durumæ* Heller. Adult male; Cat. No. 181796. (=*Rattus coucha durumæ.*)

PLATE 25.

Skulls of type-specimens (*natural size.*)

Mus musculoides emesi Heller. Adult male; Cat. No. 164819. (=*Mus emesi.*)

Mus bellus enclavæ Heller. Adult male; Cat. No. 164818.

Mus bellus gondokoræ Heller. Adult male; Cat. No. 164820.

Mus bellus petilus Hollister. Adult male; Cat. No. 162397.

Plate 26.

Skulls of type-specimens (natural size).

Mus gratus sungaræ Heller. Adult male; Cat. No. 163487. (=*Mus gratus gratus.*)
Mus gratus soricoides Heller. Adult male; Cat. No. 183544.
Mus tenellus acholi Heller. Adult male; Cat. No. 164817.
Mus wamæ Heller. Adult male; Cat. No. 161777.

Plate 27.

Skull of type-specimen of *Cricetomys gambianus raineyi* Heller.
Adult male; Cat. No. 181804. Natural size.

Plate 28.

Skull of type-specimen of *Cricetomys gambianus enguvi* Heller.
Adult female; Cat. No. 181805.

Plate 29.

Skull of type-specimen of *Cricetomys gambianus osgoodi* Heller.
Adult male; Cat. No. 181806.

Plate 30.

Skulls of type-specimens (natural size).

Upper figures. *Mus aquilus* True. Adult male; Cat. No. 34723. (=*Lophuromys aquilus.*)

Middle figures. *Lophuromys pyrrhus* Heller. Adult male; Cat. No. 164823. (=*Lophuromys ansorgei pyrrhus.*)

Lower figures. *Lophuromys aquilus margarettæ* Heller. Adult male; Cat. No. 181793.

Plate 31.

Skulls of type-specimens (natural size).

Upper figures. *Acomys hystrella* Heller. Adult female; Cat. No. 164821.
Middle figures. *Uranomys ugandæ* Heller. Adult male; Cat. No. 164822.
Lower figures. *Saccostomus isiolæ* Heller. Adult female; Cat. No. 181803.

Plate 32.

Skulls of type-specimens (natural size).

Left. *Saccostomus umbriventer* Miller. Adult female; Cat. No. 162612.
Right. *Saccostomus mearnsi* Heller. Adult male; Cat. No. 162882.
(From Smithsonian Misc. Coll., vol. 54, No. 1925, pl. 1. 1910.)

Plate 33.

Skulls of type-specimens (natural size).

Left. *Pelomys roosevelti* Heller. Adult male; Cat. No. 162881. (=*Mylomys roosevelti.*)

Right. *Dasymys helukus* Heller. Adult male; Cat. No. 162889.
(From Smithsonian Misc. Coll., vol. 54, No. 1924, pl. 1. 1910.)

Plate 34.

Skulls of type-specimens (natural size).

Upper figures. *Dasymys savannus* Heller. Adult female; Cat. No. 164471. (=*Dasymys helukus savannus.*)

Middle figures. *Dasymys helukus nigridius* Hollister. Adult female; Cat. No. 162465.

Lower figures. *Dasymys orthos* Heller. Adult male; Cat. No. 164824.

PLATE 35.

Skulls of type-specimens (natural size).

Upper figures. *Pelomys fallax iridescens* Heller. Adult male; Cat. No. 181801.

Middle figures. *Arvicanthis jebelæ* Heller. Adult male; Cat. No. 164826. (=*Arvicanthis testicularis jebelæ*.)

Lower figures. *Arvicanthis abyssinicus centrosus* Hollister. Adult male; Cat. No. 165167.

PLATE 36.

Skulls of type-specimens (natural size).

Upper figures. *Lemniscomys pulchellus spermophilus* Heller. Adult female; Cat. No. 181800. (=*Lemniscomys striatus massaicus*.)

Middle figures. *Arvicanthis pulchellus micropus* Heller. Adult female; Cat. No 164825. (=*Lemniscomys striatus massaicus*.)

Lower figures. *Arvicanthis abyssinicus virescens* Heller. Adult male; Cat. No. 183922.

PLATE 37.

Skulls of type-specimens (natural size).

Upper figures. *Eliomys parvus* True. Adult female; Cat. No. 36056. (=*Graphiurus parvus*.)

Middle figures. *Graphiurus murinus johnstoni* Heller. Adult male; Cat. No. 181787. (=*Graphiurus murinus griseus*.)

Lower figures. *Otomys orestes dollmani* Heller. Adult male; Cat. No. 181790. (=*Otomys dollmani*.)

PLATE 38.

Skulls of type-specimens (natural size).

Upper figures. *Graphiurus personatus* Heller. Adult female; Cat. No. 164827.

Lower figures. *Georychus kapiti* Heller. Adult female; Cat. No. 161708. (=*Heliophobius kapiti*.)

PLATES 39–40.

Skull of type-specimen of *Pedetes surdaster currax* Hollister. Adult male; Cat. No. 181762. Natural size.

PLATE 41.

Skull of type-specimen of *Thryonomys gregorianus pusillus* Heller. Young adult female; Cat. No. 181807. Natural size. (=*Thryonomys pusillus*.)

PLATE 42.

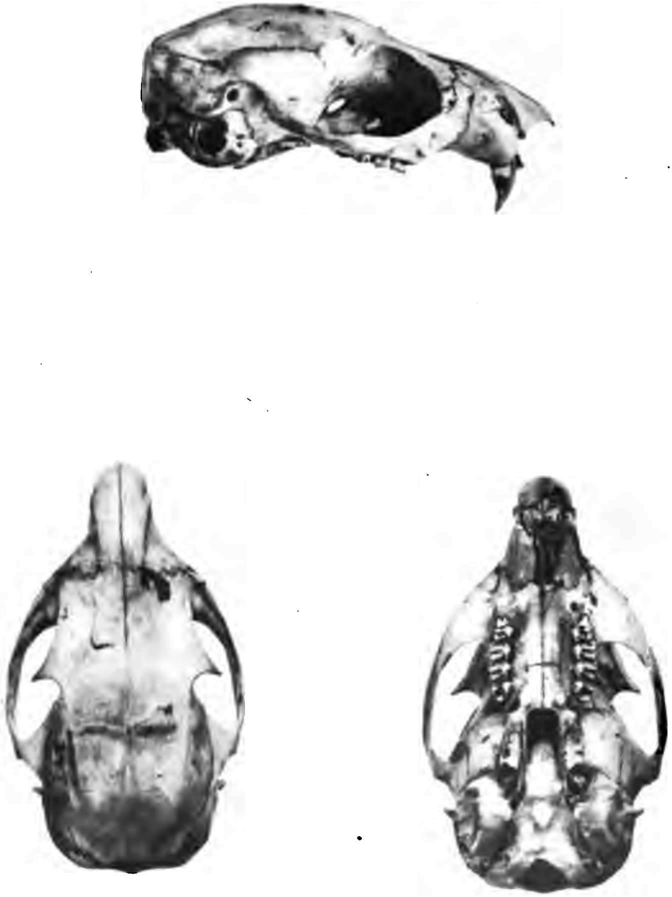
Skull of type-specimen of *Lepus raineyi* Heller. Adult female; Cat. No. 181808. Natural size.

PLATE 43.

Skull of type-specimen of *Lepus capensis abbotti* Hollister. Adult female; Cat. No. 34779 (skin No. 19014). Natural size.

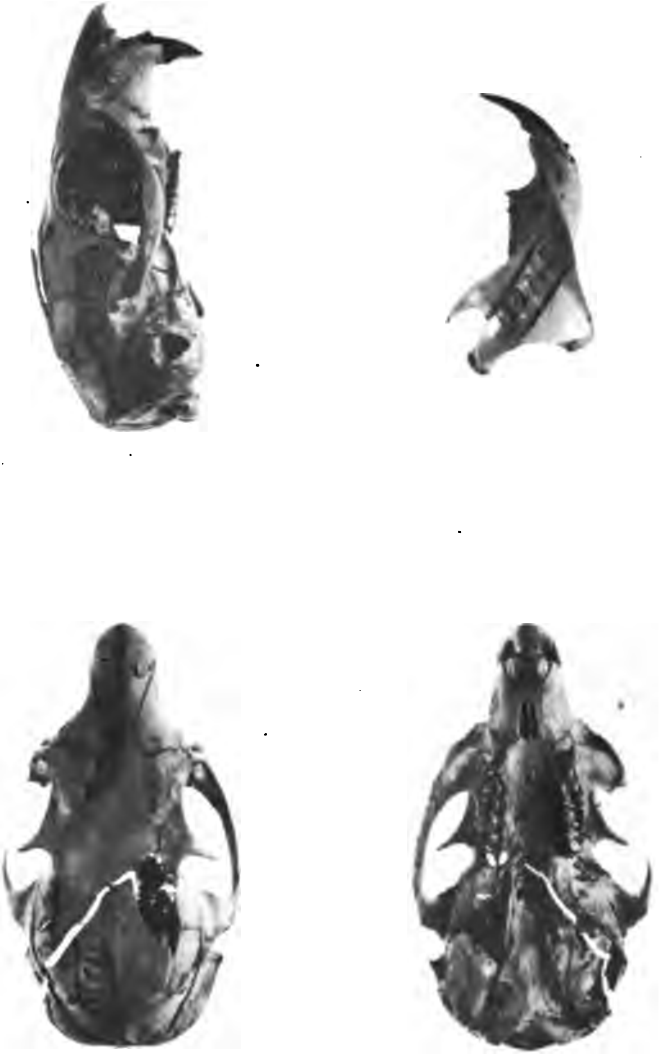
PLATE 44.

Skull of type-specimen of *Lepus kakumegæ* Heller. Adult female; Cat. No. 181809. Natural size. (=*Lepus victoriæ kakumegæ*.)



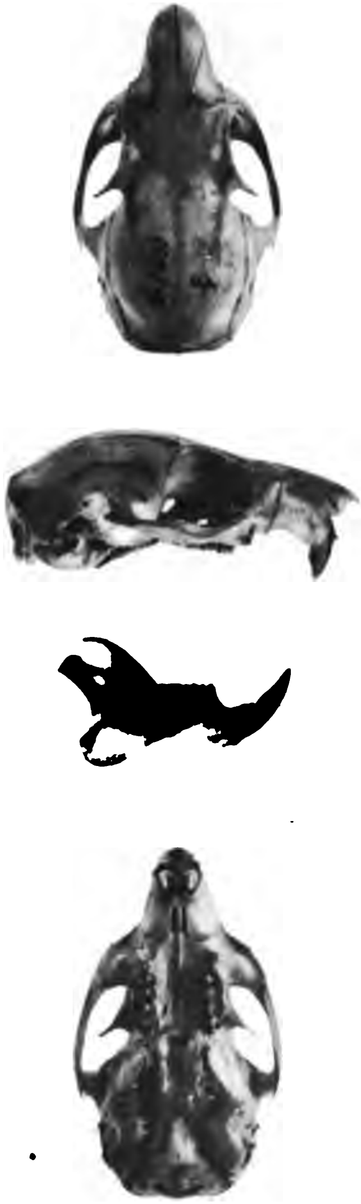
HELIOSCIURUS UNDULATUS (TRUE). TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 172.

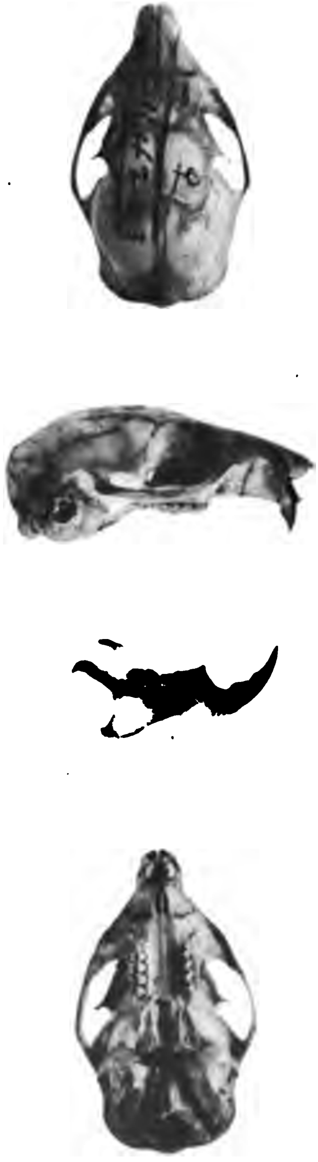


HELIOSCIURUS UNDULATUS SHINDI HELLER. TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 172.

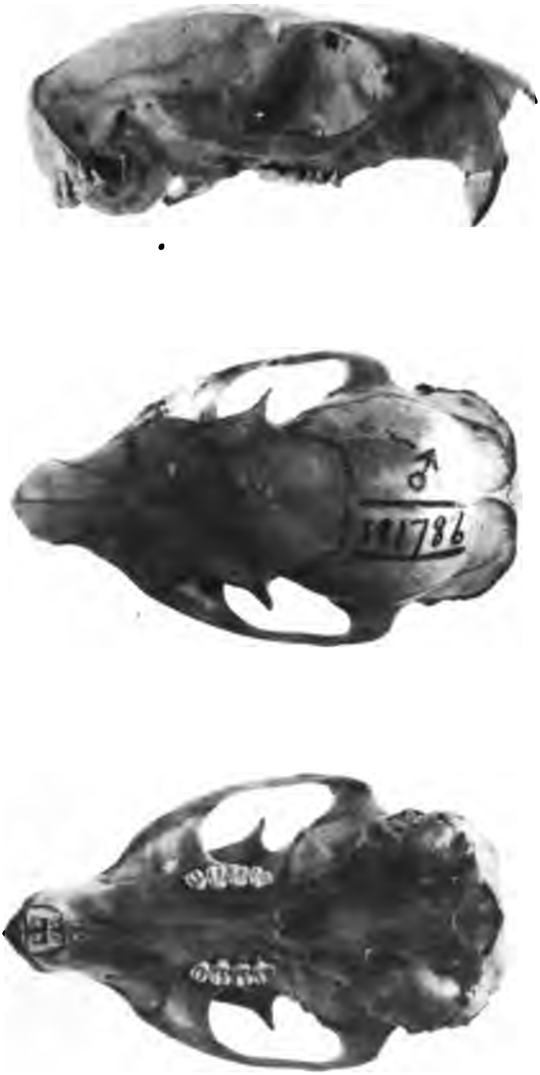


HELIOSCIURUS MULTICOLOR MADOGAE HELLER. TYPE.



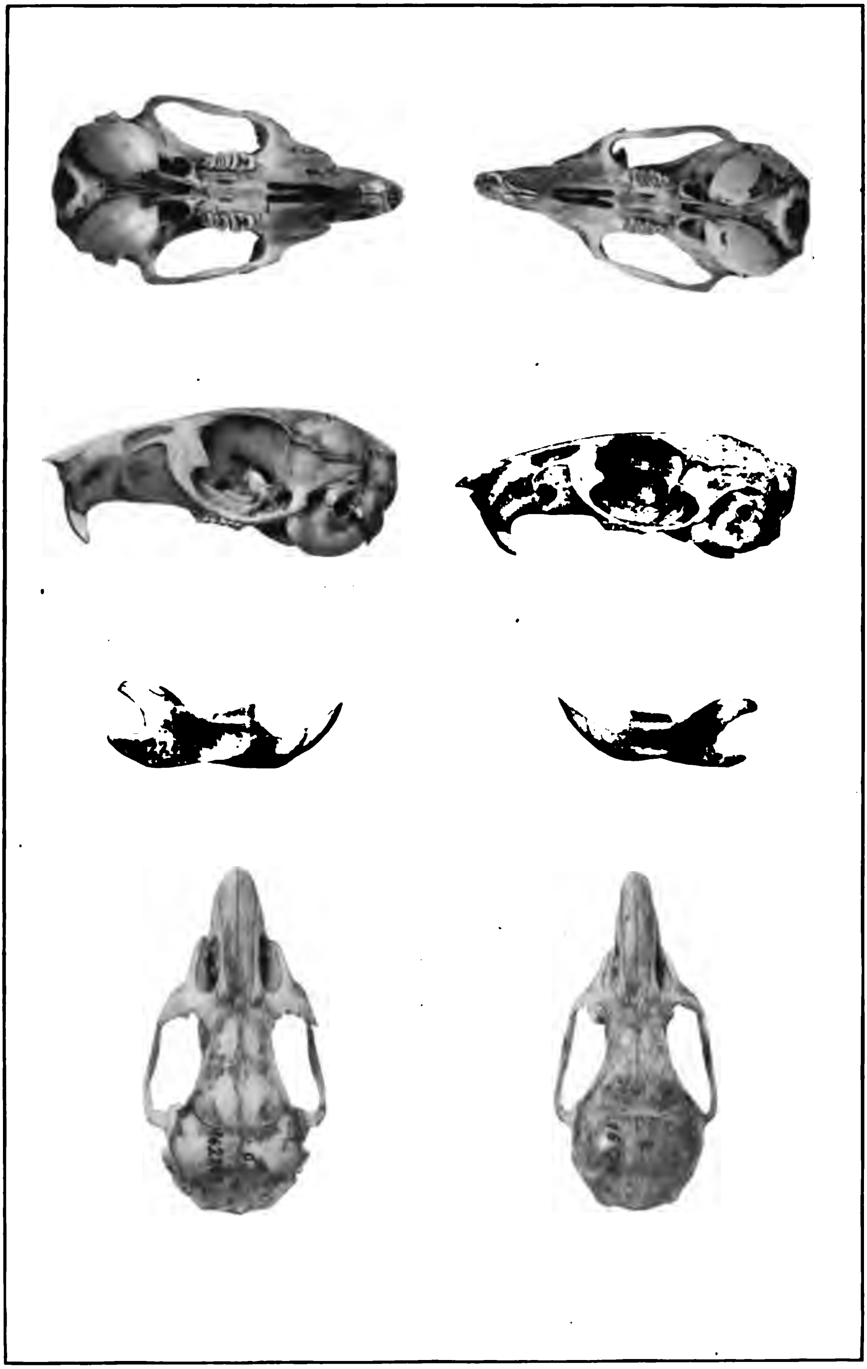
PARAXERUS OCHRACEUS KAHARI HELLER. TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 172.



PROTOXERUS STANGERI BEA HELLER. TYPE.

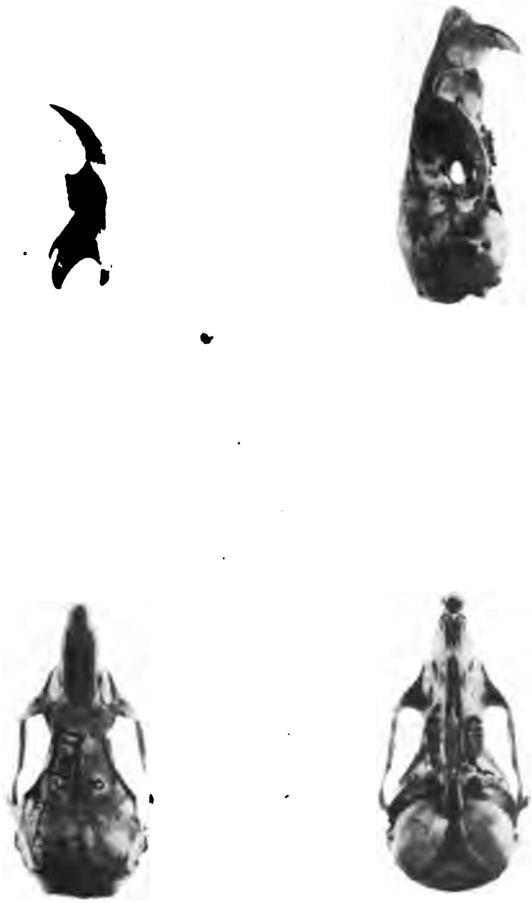
FOR EXPLANATION OF PLATE SEE PAGE 172.



TATERA BÖHMI VARIA HELLER.
TYPE.

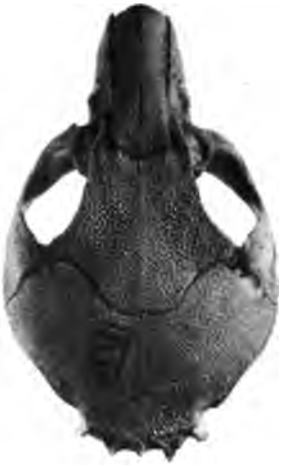
TATERA VICINA POTHAE HELLER.
TYPE.

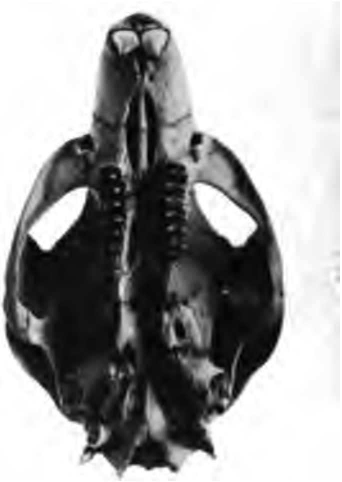
FOR EXPLANATION OF PLATE SEE PAGE 172.

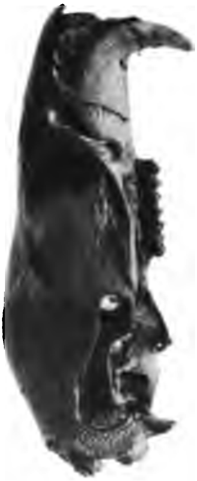


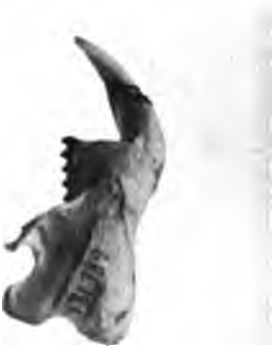
Tatera nigricauda percivali Heller. Type.

For explanation of plate see page 172.



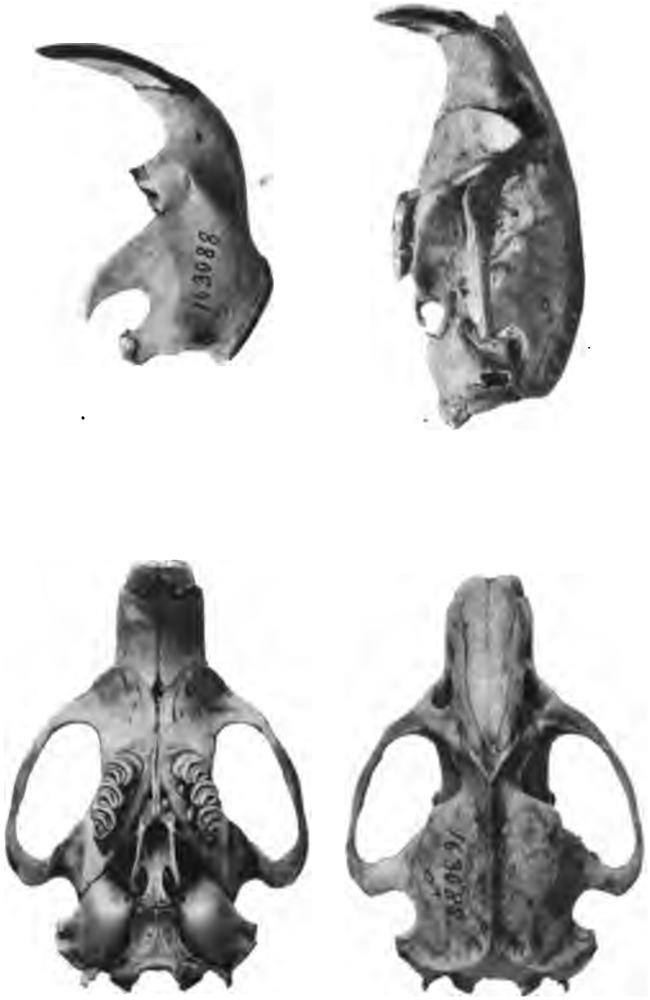






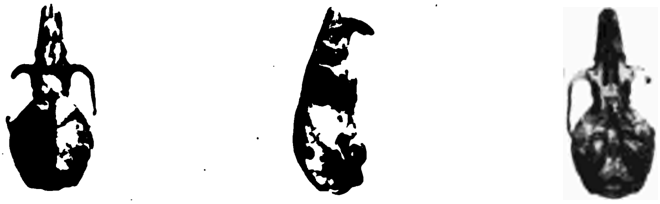
Lophiomys thomasi Heller. Type.

For explanation of plate see page 172.



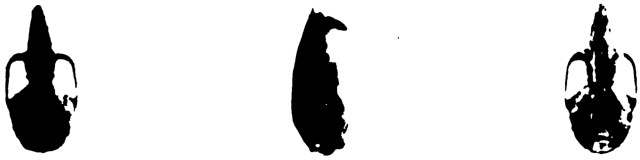
TACHYORYCTES REX HELLER. TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 172.



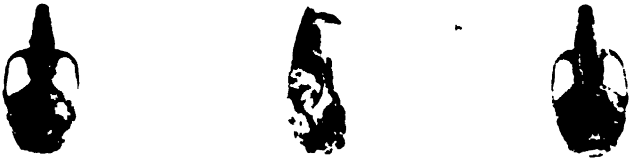
Dendromus insignis percivali Heller. Type.

Dendromus whytei capitis Heller. Type.

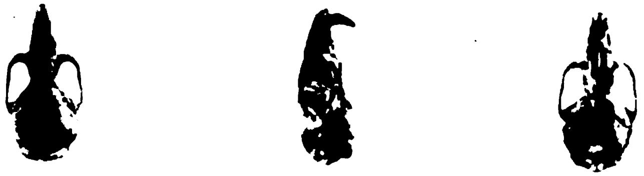


Dendromus lineatus Heller. Type.

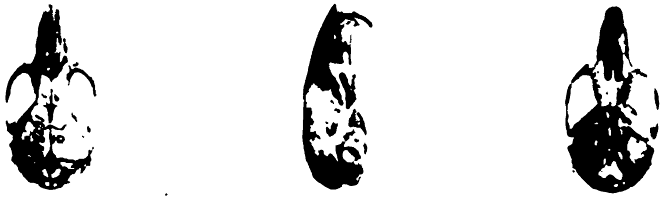
For explanation of plate see page 172.



Dendromus nigrifrons True. Type.

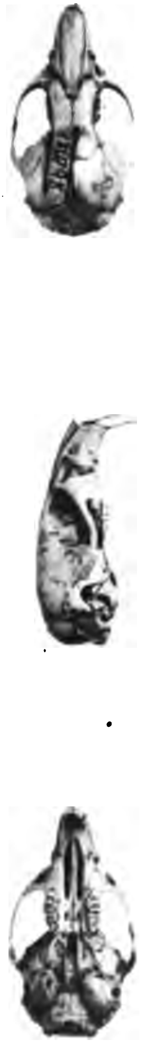


Dendromus nigrifrons spectabilis Heller. Type.

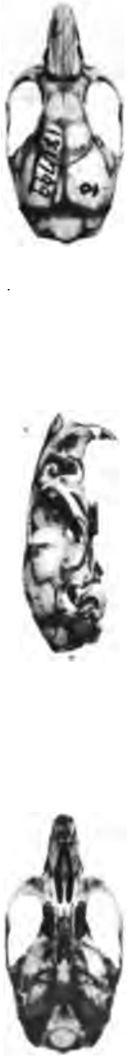


Steatomys athi Heller. Type.

For explanation of plate see page 172.

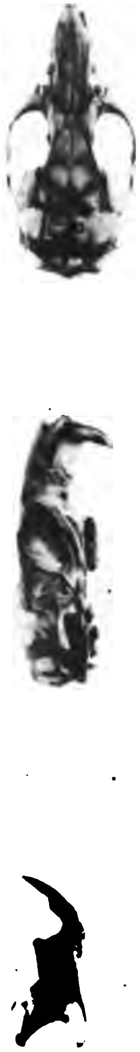


ZELOTOMYS HILDEGARDEAE VINACEUS HELLER. TYPE.

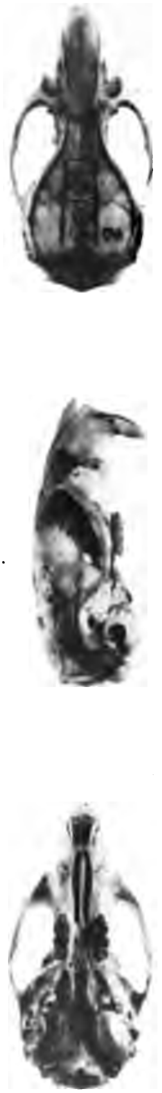


THAMNOMYS SURDASTER LITTORALIS HELLER. TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 172.

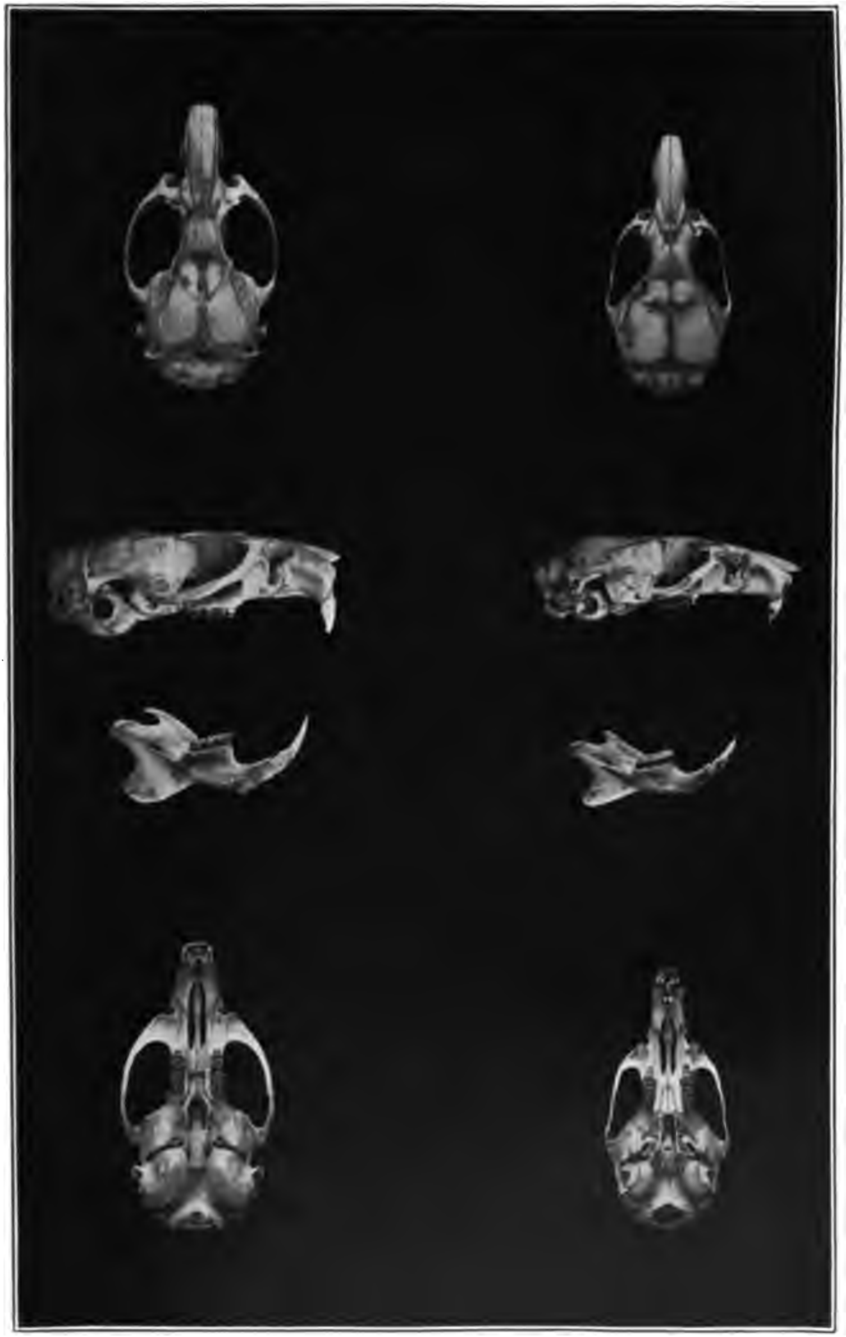


OENOMYS BACCHANTE VALLICOLA HELLER. TYPE.



RATTUSK AISERI HELLERI HOLLISTER. TYPE.

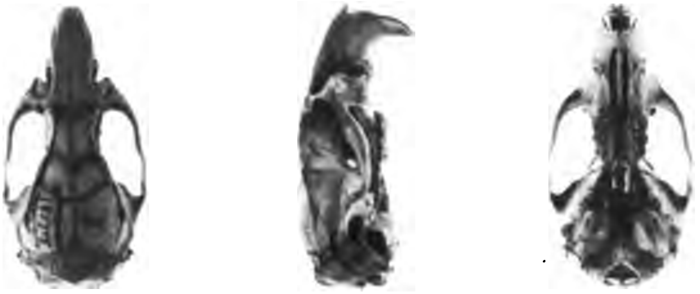
FOR EXPLANATION OF PLATE SEE PAGE 173



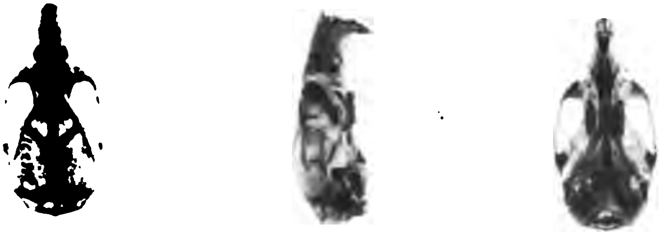
RATTUS NIGRICAUDA LORINGI (HELLER). TYPE.

RATTUS TULLBERGI PEROMYSCUS (HELLER). TYPE.

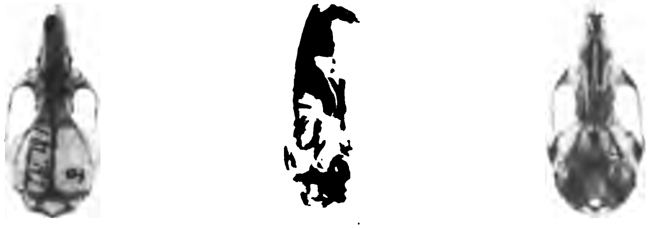
FOR EXPLANATION OF PLATE SEE PAGE 173.



Rattus kaiseri turneri (Heller). Type.

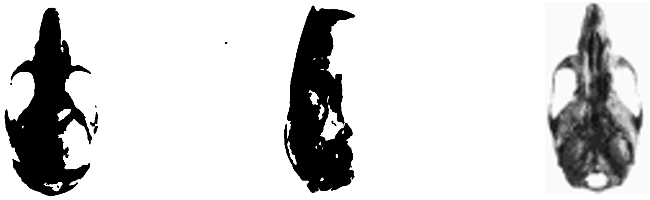


Epimys endorobae Heller. Type.

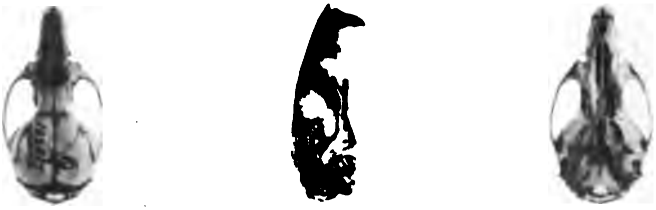


Rattus taitae (Heller). Type.

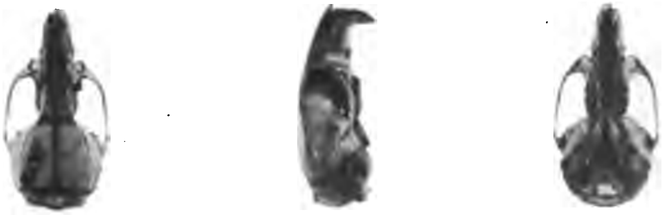
For explanation of plate see page 173.



RATTUS STELLA KAIMOSAE (HELLER). TYPE.

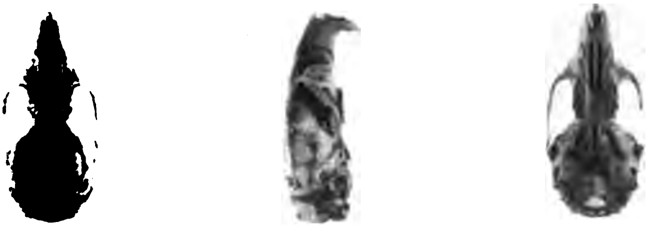


EPIMYS NIVEIVENTRIS ULAE HELLER. TYPE.

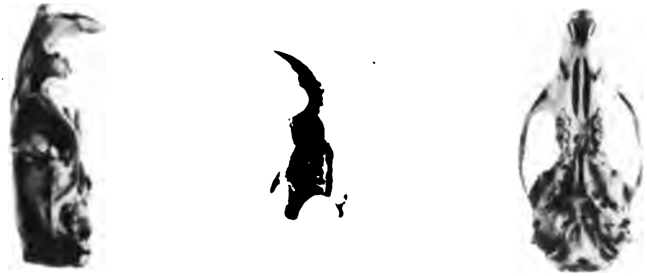


RATTUS TANA (TRUE). TYPE.

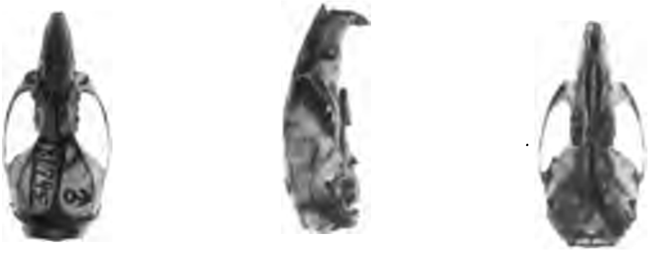
FOR EXPLANATION OF PLATE SEE PAGE 173



RATTUS COUCHA ISMAILIAE (HELLER). TYPE.

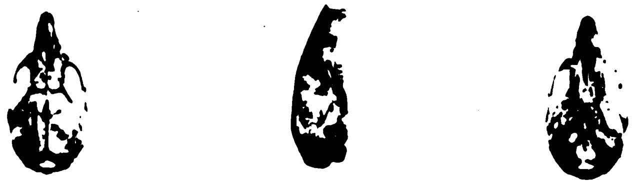


RATTUS COUCHA TINCTUS HOLLISTER. TYPE.

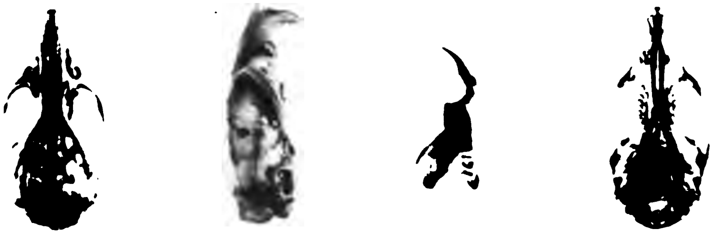


RATTUS COUCHA NEUMANI (HELLER). TYPE.

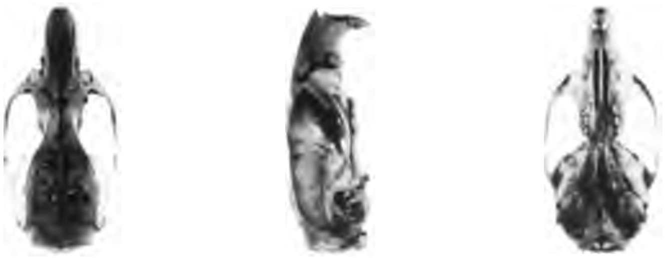
FOR EXPLANATION OF PLATE SEE PAGE 173.



Leggada naivashae Heller. Type.

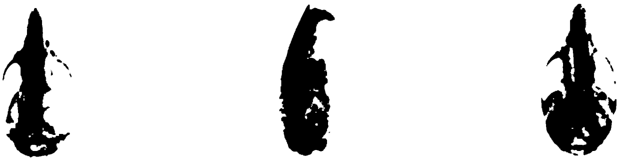


Rattus coucha panya (Heller). Type.

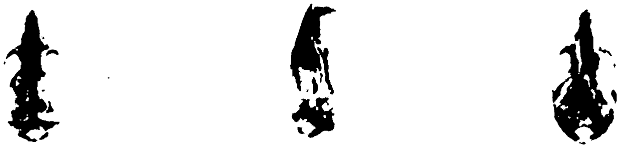


Rattus coucha curumae (Heller). Type.

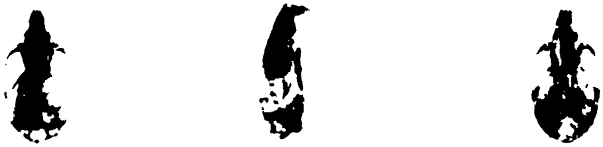
For explanation of plate see page 173



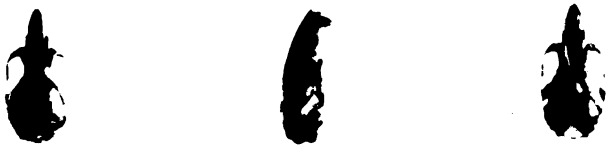
Mus emesi Heller. Type.



Mus bellus enclavae Heller. Type.



Mus bellus gondokorae Heller. Type.



Mus bellus petilus Hollister. Type.

For explanation of plate see page 173

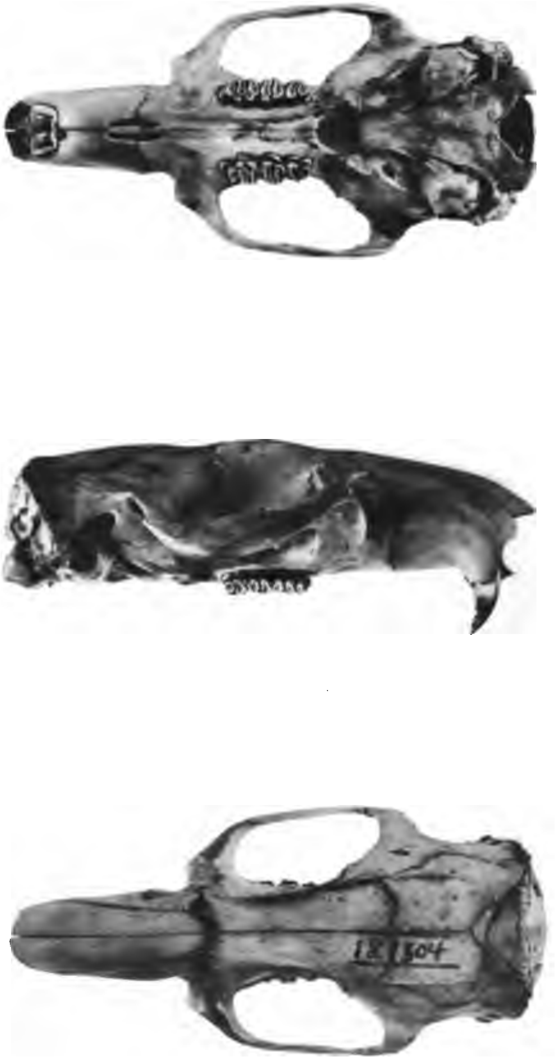
Mus gratus sungarae Heller. Type.

Mus gratus soricoides Heller. Type.

Mus tenellus acholi Heller. Type.

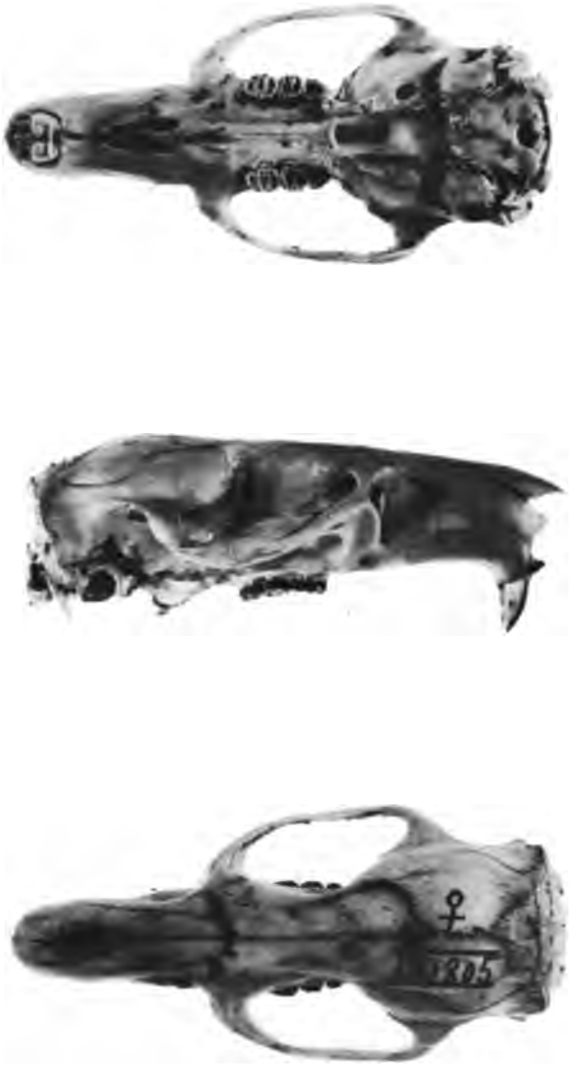
Mus wamae Heller. Type.

For explanation of plate see page 174.



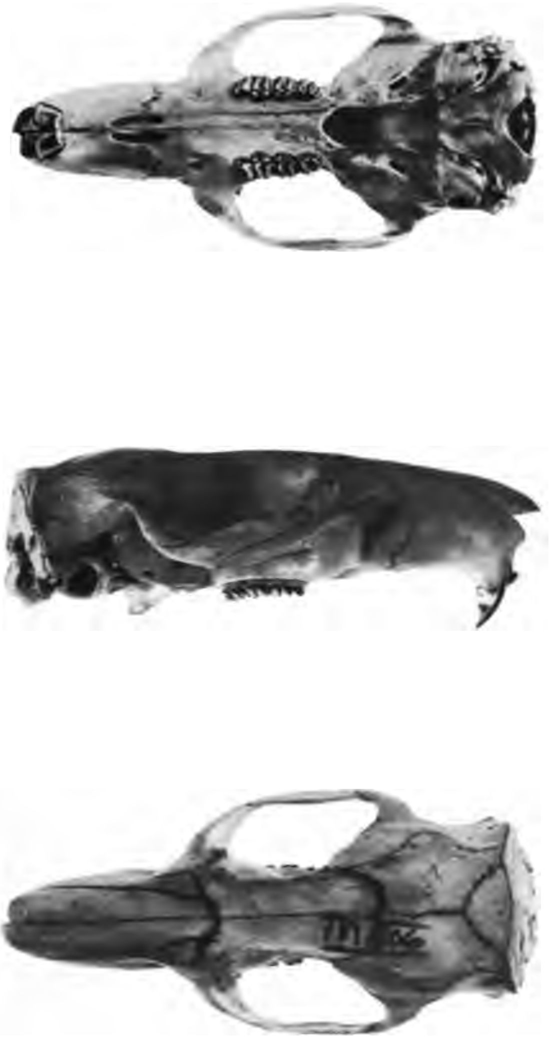
Cricetomys gambianus raineyi Heller. Type.

For explanation of plate see page 174.



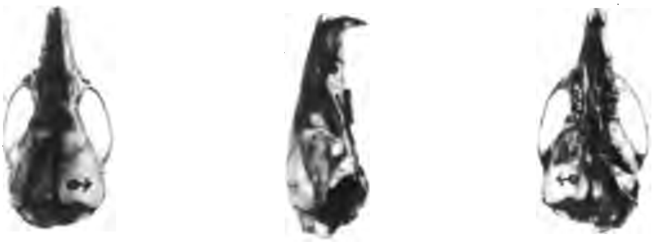
Cricetomys gambianus enguvi Heller. Type.

For explanation of plate see page 174

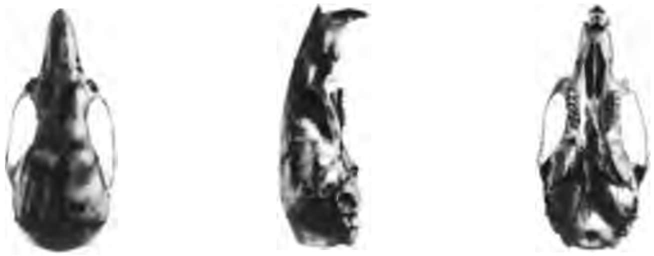


CRICETOMYS GAMBIANUS OSGOODI HELLER. TYPE.

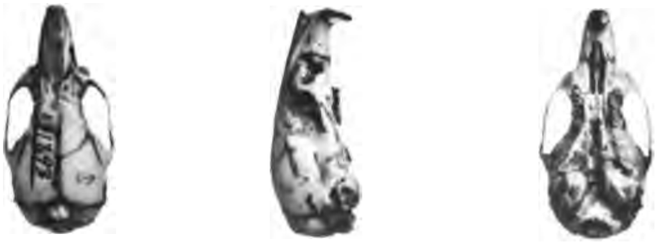
FOR EXPLANATION OF PLATE SEE PAGE 174.



Lophuromys aquilus (True). Type.

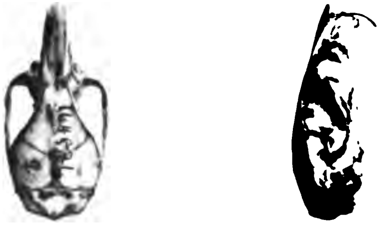


Lophuromys ansorgei pyrrhus Heller. Type.

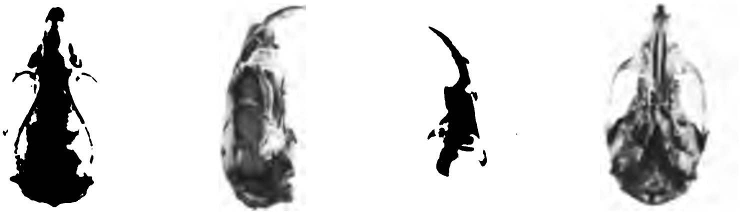


Lophuromys aquilus margarettae Heller. Type.

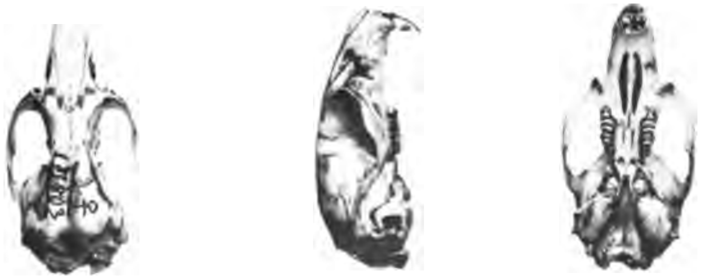
For explanation of plate see page 174.



ACOMYS HYSTRELLA HELLER. TYPE.

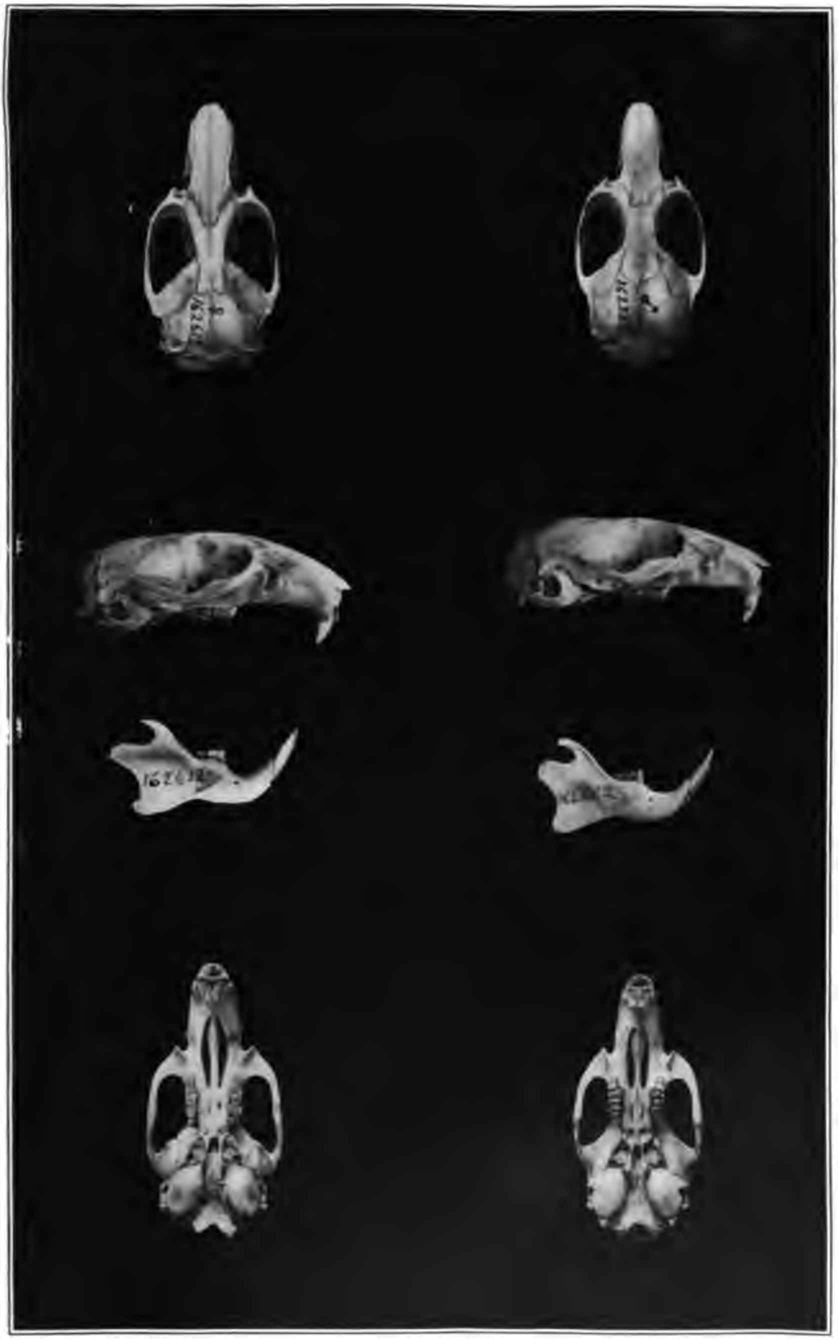


URANOMYS UGANDAE HELLER. TYPE.



SACCOSTOMUS ISIOLAE HELLER. TYPE.

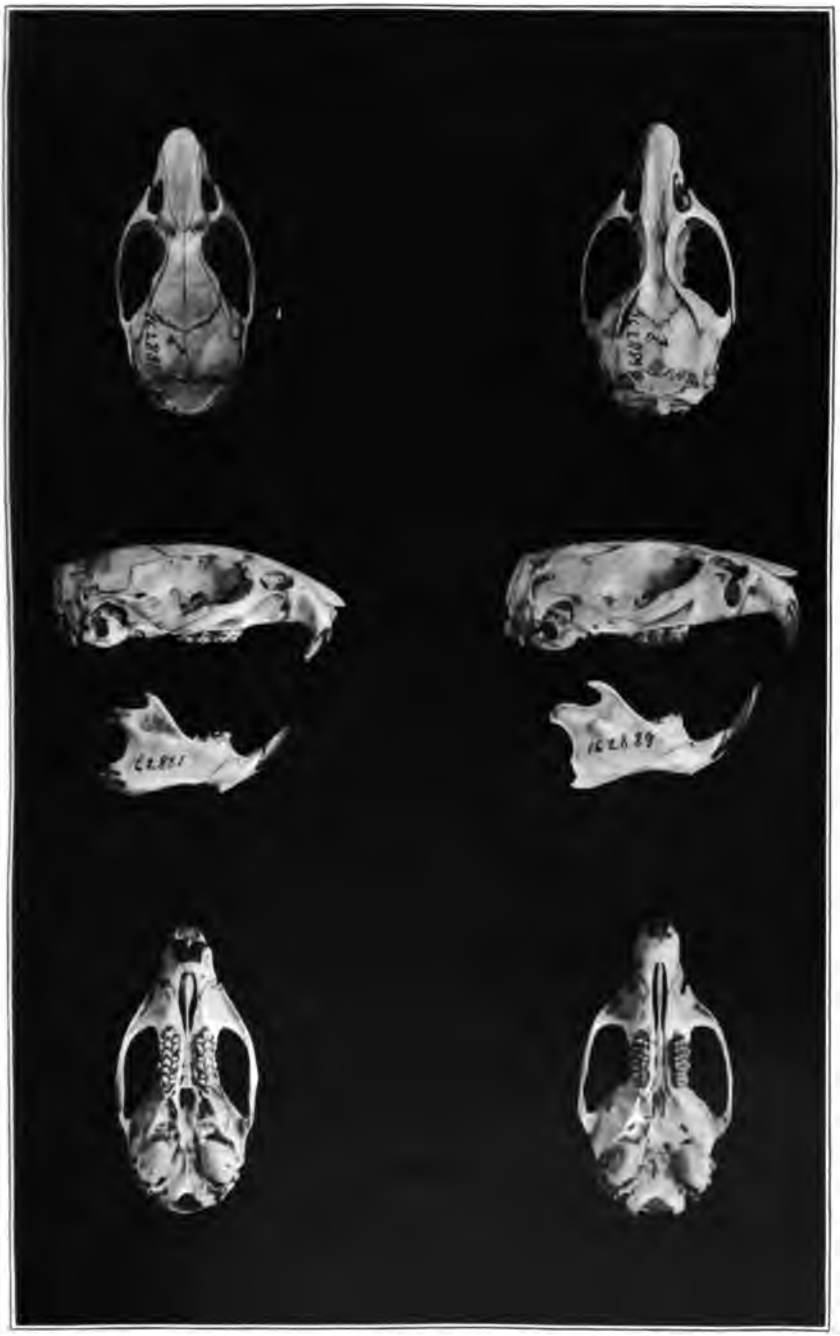
FOR EXPLANATION OF PLATE SEE PAGE 174.



Saccostomus umbriventer Miller.
Type.

Saccostomus mearnsi Heller.
Type.

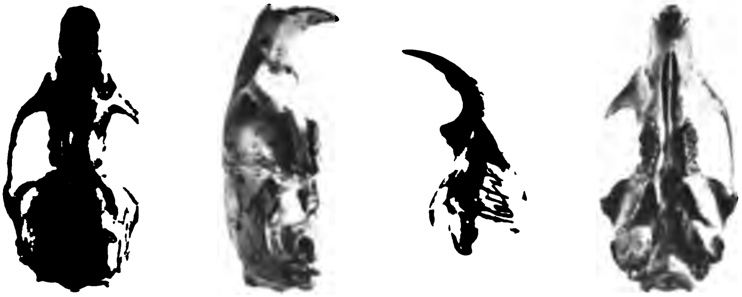
For explanation of plate see page 174.



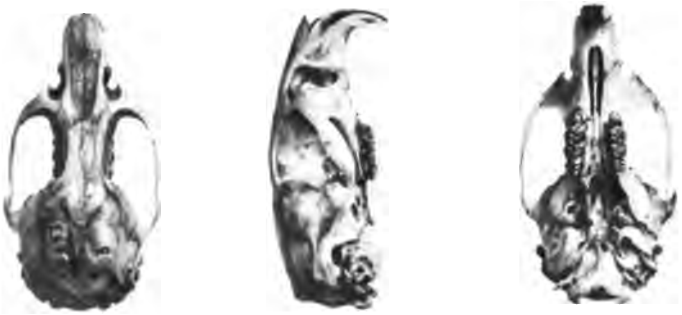
MYLOMYS ROOSEVELTI (HELLER).
TYPE.

DASYMYS HELUKUS HELLER.
TYPE.

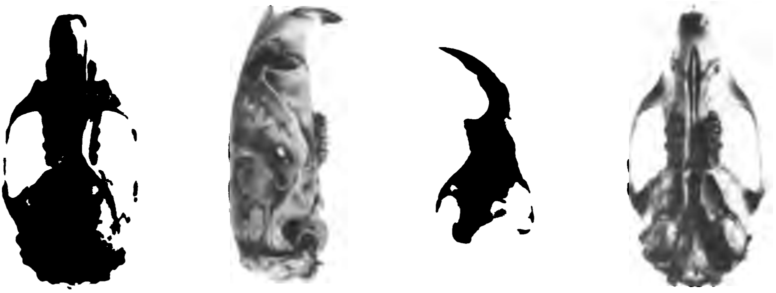
FOR EXPLANATION OF PLATE SEE PAGE 174.



DASYMYS HELUKUS SAVANNUS HELLER. TYPE.

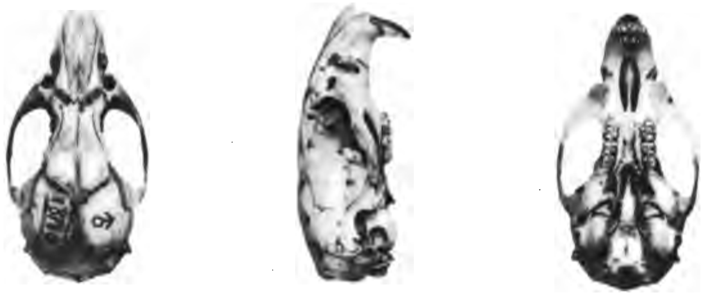


DASYMYS HELUKUS NIGRIDIUS HOLLISTER. TYPE.

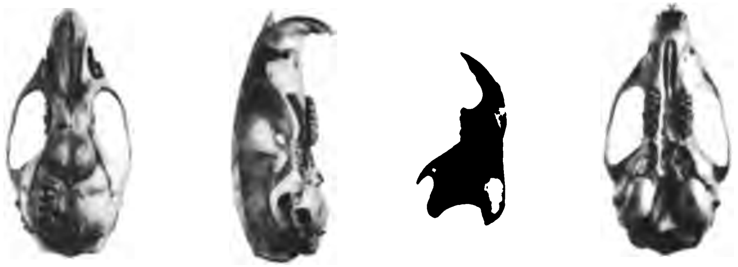


DASYMYS ORTHOS HELLER. TYPE.

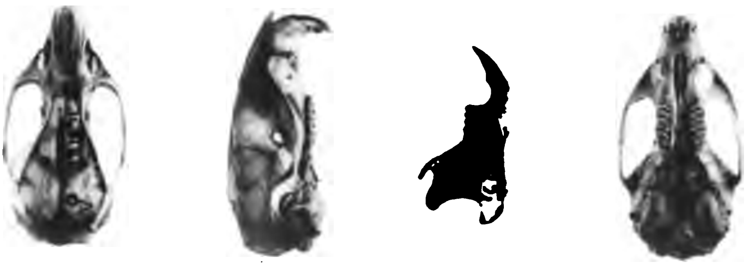
FOR EXPLANATION OF PLATE SEE PAGE 174.



Pelomys fallax iridescens Heller. Type.

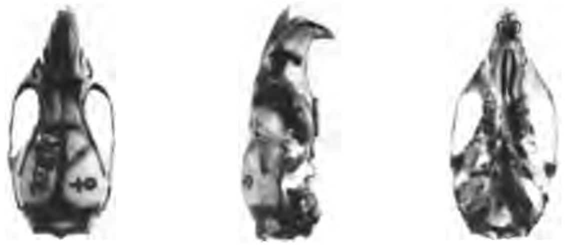


Arvicanthis testicularis jebelae Heller. Type.

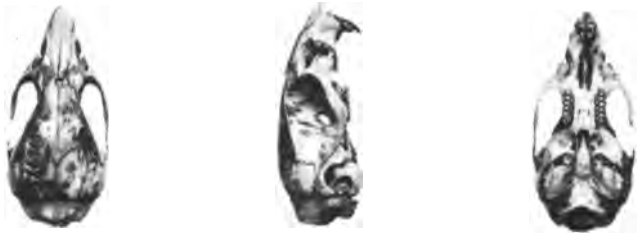


Arvicanthis abyssinicus centrosus Hollister. Type.

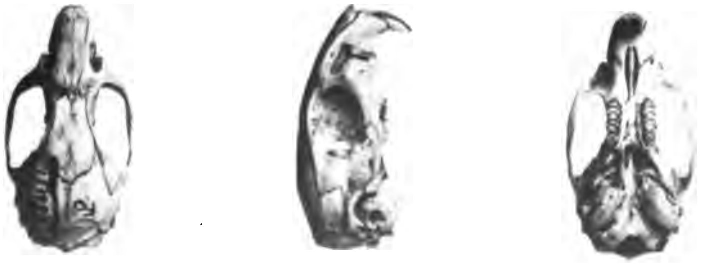
For explanation of plate see page 175.



Lemniscomys pulchellus spermophilus Heller. Type.

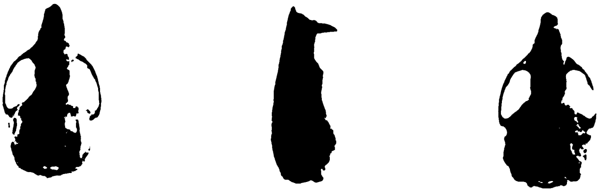


Arvicanthis pulchellus micropus Heller. Type.

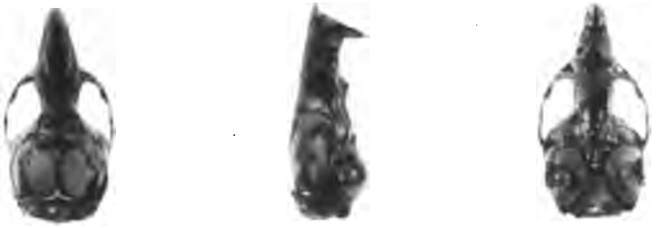


Arvicanthis abyssinicus virescens Heller. Type.

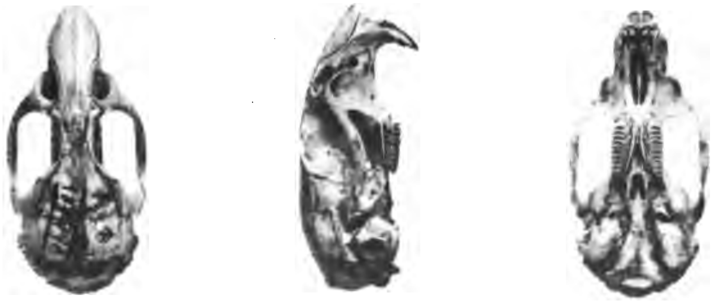
For explanation of plate see page 175.



GRAPHIURUS PARVUS (TRUE). TYPE.

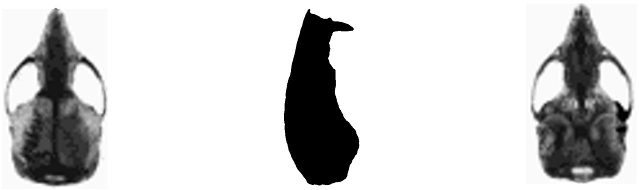


GRAPHIURUS MURINUS JOHNSTONI HELLER. TYPE.

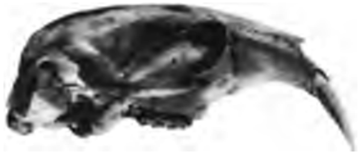


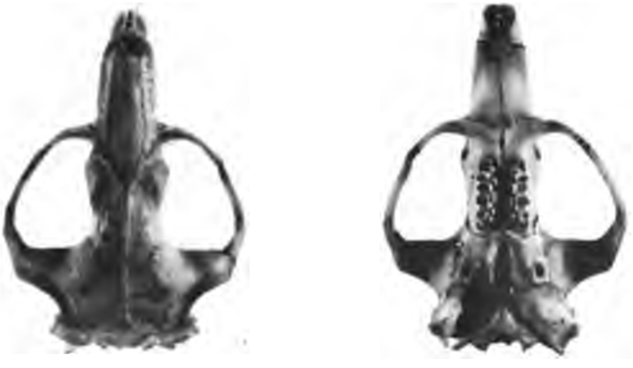
OTOMYS DOLLMANI HELLER. TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 175.



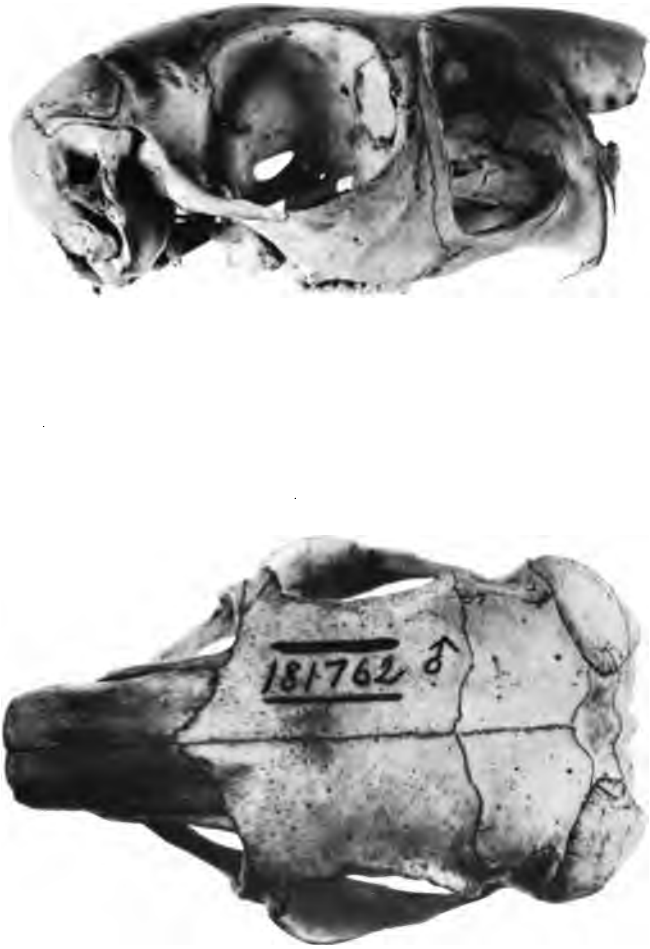
GRAPHIURUS PERSONATUS HELLER. TYPE.





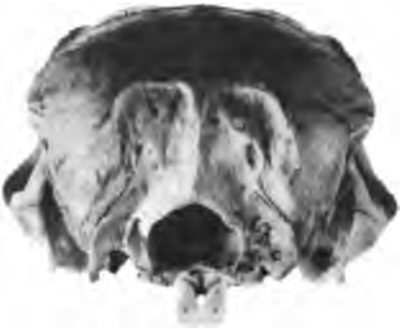
HELIOPHOBIUS KAPITI (HELLER). TYPE.

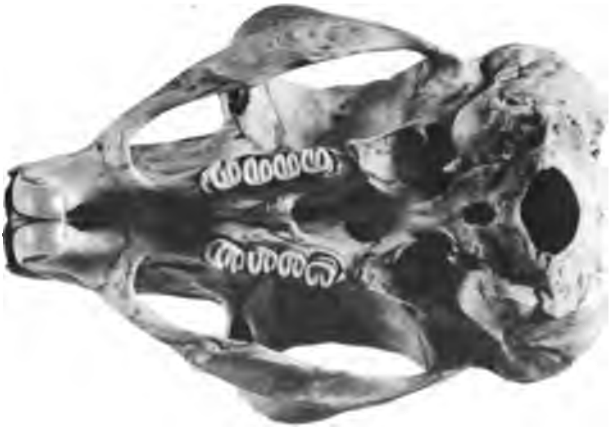
FOR EXPLANATION OF PLATE SEE PAGE 175



Pedetes surdaster currax Hollister. Type.

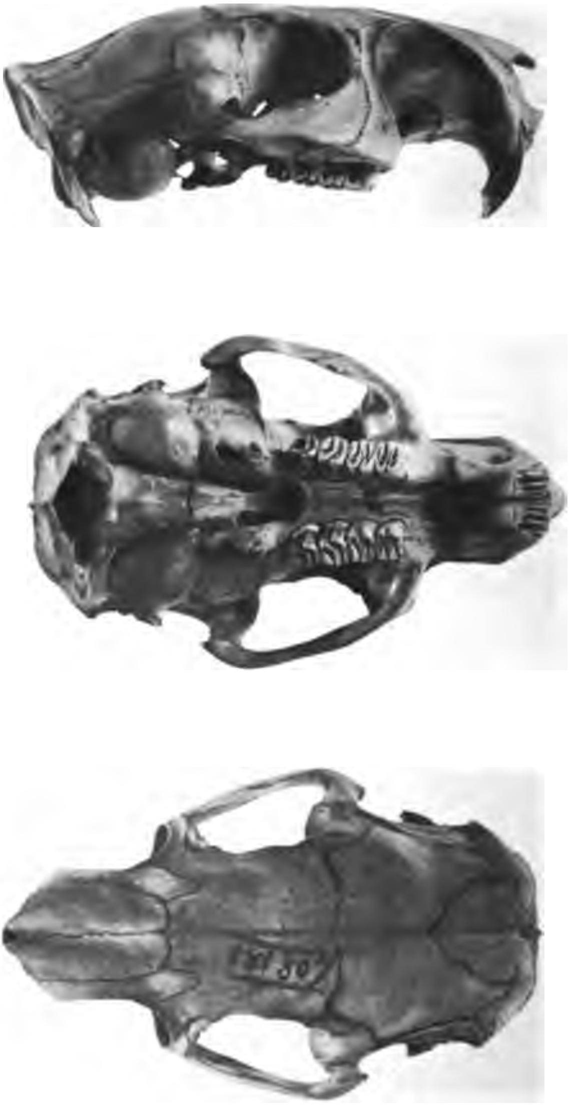
For explanation of plate see page 175.





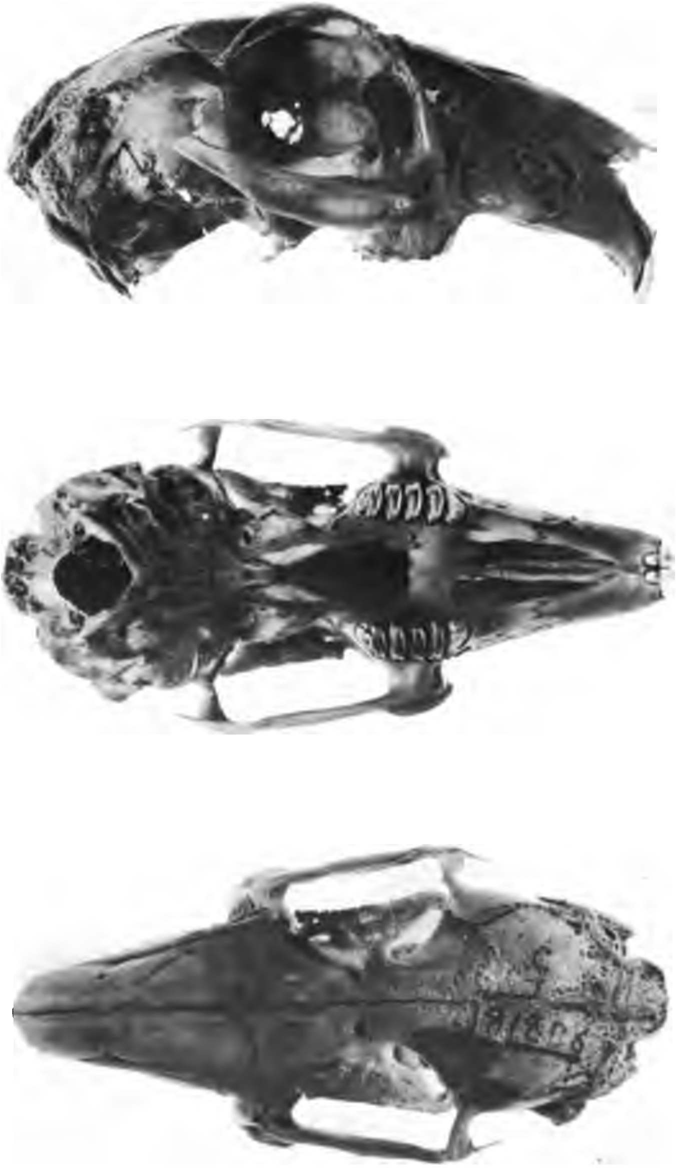
PEDETES SURDASTER CURRAX HOLLISTER. TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 175.



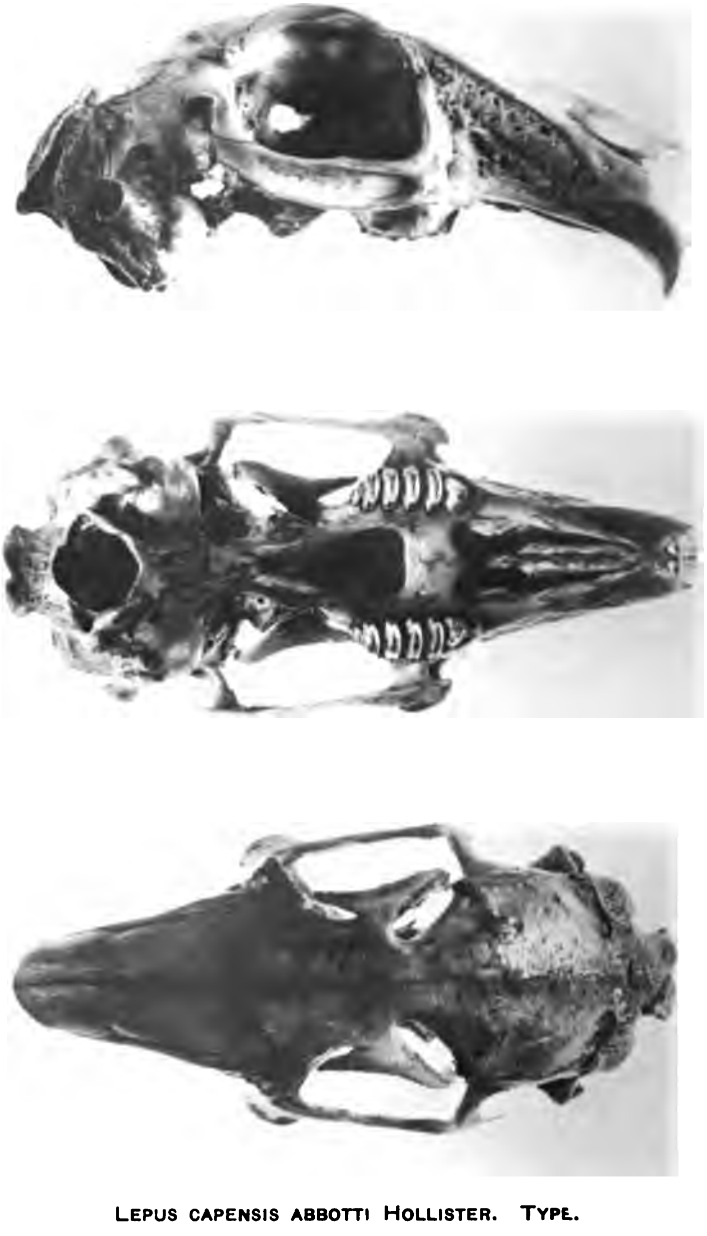
THRYONOMYS PUSILLUS HELLER. TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 176.



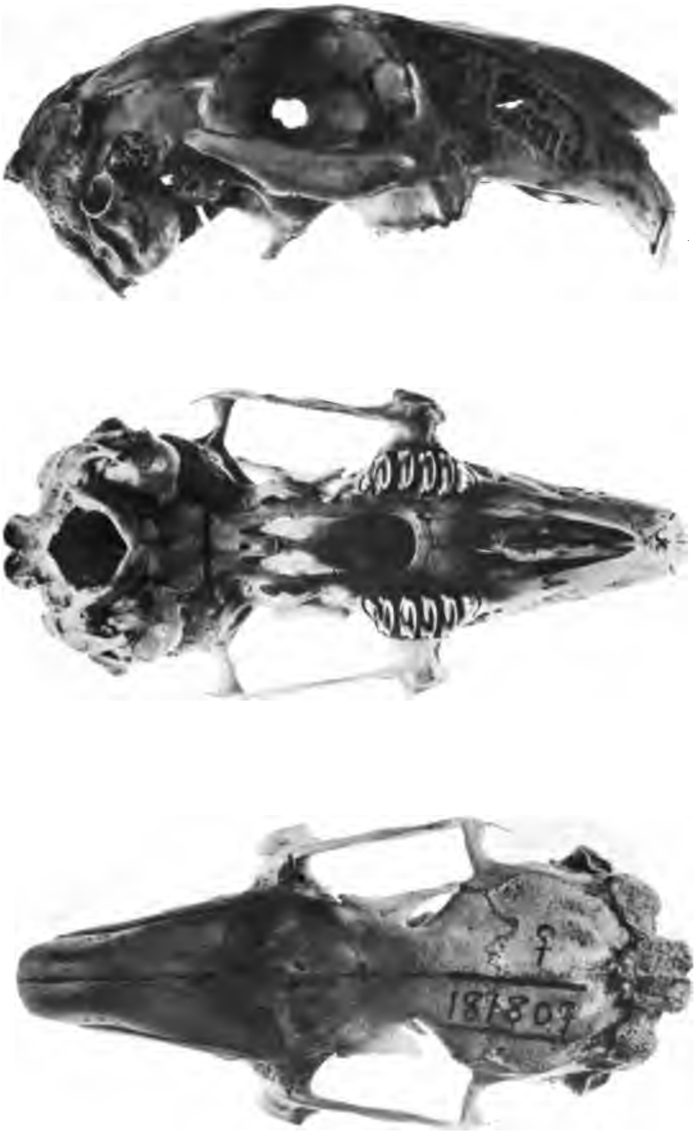
LEPUS RAINEYI HELLER. TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 175.



LEPUS CAPENSIS ABBOTTI HOLLISTER. TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 178.



LEPUS VICTORIAE KAKUMEGAE HELLER. TYPE.

FOR EXPLANATION OF PLATE SEE PAGE 175.

INDEX.

[Figures in black-faced type indicate generic or specific headings.]

Page.

- aard-vark 169
- abbotti, Lepus 165, 166
- ablutus, Acomys 118, 121
- abyssinicus, Arvicanthis 128
- acholi, Mus 101, 103
- Acomys 116, 117, 119, 120
  - ablutus 118, 121
  - cahirinus 116
  - cineraceus 116
  - hystrella 118, 119
  - ignitus 118, 119
  - kempi 116, 117, 120
  - montanus 117, 120
  - percivali 118, 120
  - pulchellus 117
  - wilsoni 118, 121
  - witherbyi 116
- acræus, Dendromus 50, 52
- æthiopicus, Lophiomys 36, 37
  - Orycteropus 170
- Æthomys 66, 67, 72, 77
- Æthosciurus 9, 10, 12
  - lucifer 10
  - poensis 10
  - ruwenzorii 10
- afer, Lophuromys 106
  - Orycteropus 169
- afra, Tatera 28
- africæaustralis, Hystrix 162
- akka, Arvicanthis 139
- albifrons, Heliophobius 161
- albolineatus, Arvicanthis 144
  - Lemniscomys 143, 144
- alexandrinus, Rattus 68
- amalæ, Epimys 76
- ambigua, Hystrix 162
- angoniensis, Otomys 149
- animosus, Paraxerus 19, 20
- ankoliae, Tachyoryctes 47, 48
- annectens, Rhizomys 43
  - Tachyoryctes 40, 43
- ansorgei, Heterocephalus 160
  - Lophuromys 109, 111
- aquilus, Lophuromys 106, 107, 110
  - Mus 106
- arborarius, Mus 57
- ardens, Arvicanthis 144
  - Lemniscomys 141, 144
- argenteocinereus, Heliophobius 161
- aruscensis, Paraxerus 15, 17, 18
  - Sciurus 15

Page.

- Arvicanthis 127, 128, 132, 134, 136, 146
  - abyssinicus 128
  - akka 139
  - albolineatus 144
  - ardens 144
  - centrosus 128, 132
  - chanleri 131, 135, 136
  - convictus 146
  - diminutus 146
  - jebelæ 128, 132
  - macculus 138
  - maculosus 136
  - massaicus 139, 142
  - micropus 139, 141
  - nairobæ 130, 131, 134, 138
  - neumanni 131
  - niloticus 127
  - nubilans 129, 133
  - pallescens 130, 134
  - phæotis 136
  - præceps 130, 134
  - pulchellus 142
  - reptans 131, 135
  - rubescens 128, 129, 133
  - somalicus 131
  - striatus 142
  - testicularis 128, 132
  - virescens 131, 135
- athi, Steatomys 55
- audax, Tachyoryctes 42, 43, 46
- augustus, Paraxerus 20
- Aulacodus 163
  - gregorianus 164
  - swinderianus 163
- bacchante, Mus 64
  - Œnomys 64, 65
- badius, Tachyoryctes 40
- barbarus, Lemniscomys 136, 143, 144
  - Mus 144
- Bathyergidæ 159
- bea, Protoxerus 21
- Beamys 112
  - hindei 112, 113
- bella, Leggada 97
- bellus, Mus 97, 100
- bentleyæ, Dasymys 123
- blesmols 161
- bodessæ, Tatera 31
- boehmi, Paraxerus 14
- böhmi, Tatera 28, 36
- bozasi, Lophiomys 37, 39

Page.

- brachyotus, Xerus, 22
- broad-headed mouse, 55
- cafer, Pedetes, 156
- cahirinus, Acomys, 116
- campestris, Saccostomus, 114
- canescens, Otomys, 149, 151
- capensis, Graphiurus, 152
  - Lepus, 164, 165, 168
- capitis, Dendromus, 49, 52
  - Paraxerus, 16
- centralis, Epimys, 71
  - Mus, 71
- centricola, Protoxerus, 21
  - Sciurus, 21
- centrosus, Arvicanthis, 128, 132
- cepapi, Paraxerus, 14
  - Sciurus, 15
- chanleri, Arvicanthis, 131, 135, 136
- Chrysomys, 40
- chrysophilus, Rattus, 76
- cineraceus, Acomys, 116
- colonus, Rattus, 66
- conradsi, Hystrix, 162
- convictus, Arvicanthis, 146
  - Lemniscomys, 143, 146
- coucha, Rattus, 67, 87, 89, 94
- crawshayi, Lepus, 165, 166, 168
- creek rat, 125
- Cricetidæ, 25
- Cricetomys, 103, 104, 105
  - elgonis, 104, 105
  - enguvi, 104, 105
  - gambianus, 103
  - kenyensis, 104, 105
  - osgoodi, 105, 106
  - raineyi, 103, 104, 106
- cristata, Hystrix, 162
- cuninghamei, Mus, 89
  - Mylomys, 125
  - Rattus, 89
- currax, Pedetes, 157, 158
- dæmon, Tachyoryctes, 44, 47
- Dasymus helukus, 122
- Dasymys, 122, 124
  - bentleyæ, 123
  - gueinzii, 122
  - helukus, 122, 123, 124
  - incomtus, 122
  - medius, 123, 125
  - nigridius, 123, 124
  - orthos, 123, 125
  - savannus, 122, 123, 124
- daucinus, Heliosciurus, 12, 13
- Dendromus, 48, 49, 51, 52, 54
  - acræus, 50, 52
  - capitis, 49, 52
  - insignis, 48, 51
  - lineatus, 50, 53
  - melanotis, 48
  - mesomelas, 48
  - nairobæ, 50
  - nigrifrons, 53, 54
  - ochropus, 50, 52
  - pallescens, 49, 52
  - percivali, 48, 49, 51
  - ruddi, 50, 52, 54

Page.

- Dendromus spectabilis, 53, 54
  - whytei, 49
- Dendromys, 48
  - insignis, 48
  - nigrifrons, 54
  - nigrofrons, 54
- dennisæ, Mus, 79
  - Rattus, 67, 79, 80, 82
- dichrura, Tatera, 36
- diminutus, Arvicanthis, 146
  - Dipodillus, 25, 26
  - Isomys, 146
  - Rhabdomys, 145, 146
- Dipodillus, 25, 26
  - diminutus, 25, 26
  - harwoodi, 26, 27
  - luteus, 27, 28
  - percivali, 25
  - simoni, 25
  - stigmonyx, 25, 26
  - watersi, 25, 26
- discolor, Thamnomys, 61, 62
- dolichurus, Thamnomys, 57
- dollmani, Graphiurus, 154, 156
  - Otomys, 147, 150
- dormice, 152
- dorsalis, Xerus, 24
- dorsatus, Erethizon, 38
- dundasi, Tatera, 32, 35
- durumæ, Epimys, 95
  - Rattus, 67, 93, 96
- editus, Œnomys, 64, 65
- effectus, Epimys, 87, 94
- elassodon, Otomys, 149, 151
- elgonis, Cricetomys, 104, 105
  - Otomys, 149, 151
  - Thamnomys, 62
- Eliomys murinus, 153
  - parvus, 154
- emesi, Mus, 96, 97, 99
- emini, Gerbillus, 25
  - Paraxerus, 14, 15, 17
  - Sciurus, 14
  - Tamiscus, 14
  - Tatera, 28
  - Taterillus, 28
- enclavæ, Mus, 97, 99
- endorobæ, Epimys, 77, 79, 81
- enguvi, Cricetomys, 104, 106
- Eosaccomys, 114
- Epimys, 66, 67
  - amalæ, 76
  - centralis, 71
  - durumæ, 95
  - effectus, 87, 94
  - endorobæ, 77, 79, 81
  - evelyni, 87
  - hindei, 72
  - ismailiæ, 87, 88
  - jacksoni, 77
  - jujensis, 68, 69
  - kaimosæ, 82
  - neumani, 89
  - panya, 89
  - peromyscus, 77
  - rattus, 68

Page.
Epimys stella ... 82
  taitæ ... 79
  turneri ... 72
  ugandæ ... 88
  ulæ ... 82, 83, 85
  verreauxi ... 82
Erethizon dorsatus ... 38
erythopus, Euxerus ... 24
Euxerus ... 23, **24**
  erythopus ... 24
  fulvior ... 24
  lacustris ... 23, **24**
  leucoumbrinus ... 23, **24**
  microdon ... 23, **24**
evelyni, Epimys ... 87
fallax, Pelomys ... 125
fat mouse ... 55
fors, Mus ... 96
fulvior, Euxerus ... 24
  Xerus ... 24
fumatus, Mus ... 82, 83
  Rattus ... 67, **82**, 84, 86
galeata, Hystrix ... **162**
gambianus, Cricetomys ... 103
  Heliosciurus ... 9
ganana, Paraxerus ... 16, 19
  Sciurus ... 16
gazellæ, Thamnomys ... 61, **63**
gentilis, Mus ... 103
Georychus kapiti ... 161
Gerbilliscus ... 28, 36
Gerbillus ... 27
  emini ... 28
  harwoodi ... 27
  nigricaudus ... 30, 31
  pusillus ... 25
  vicinus ... 29
  watersi ... 25
gerbils ... 28
  pigmy ... 25, 26
giant forest squirrel ... 21
  rats ... 103
gigas, Thamnomys ... 62
glaber, Heterocephalus ... 159, **160**
gondokoræ, Mus ... 97, 100
Grammomys ... 57
Graphiuridæ ... 152
Graphiurus ... **152**, 153, 155, 156
  capensis ... 152
  dollmani ... **154**, 156
  griseus ... **152**, 153, 155
  internus ... 154
  isolatus ... **153**, 155, 156
  johnstoni ... 152, 155
  murinus ... 152
  ocularis ... 152
  parvus ... 152, 153, **154**, 156
  personatus ... **154**, 156
  raptor ... **152**, 155
  saturatus ... 152, **153**, 155
grass rats ... 128
grata, Leggada ... 102
gratus, Mus ... 100, **102**
gregorianus, Aulacodus ... 164
  Thryonomys ... **164**
griselda, Lemniscomys ... 136, 137, 138

Page.
griseus, Graphiurus ... **152**, 153, 155
ground-squirrel ... 22
gueinzii, Dasymys ... 122
hares ... 164
  jumping ... 156
harsh-furred mice ... 106
harwoodi, Dipodillus ... 26, **27**
  Gerbillus ... 27
Heliophobius ... 161
  albifrons ... 161
  argenteocinereus ... 161
  kapiti ... 161
  pallidus ... 161
  spalax ... 161
Heliophobus ... 161
Heliosciurus ... **9**, 10, 12, 13
  daucinus ... **12**, 13
  gambianus ... 9
  keniæ ... 11, 13
  lateris ... 14
  madogæ ... 13, 14
  marwitzi ... 11, 12
  multicolor ... 14
  nyansæ ... 11, 13
  poensis ... 9
  rufobrachiatus ... 11
  ruwenzorii ... 10, 13
  shindi ... **12**, 13
  undulatus ... 11, 13, 14
helleri, Rattus ... 67, 71, 72, 73
helukus, Dasymus ... 122
  Dasymys ... **122**, 123, 124
Heterocephalus ... **159**, 160
  ansorgei ... 160
  glaber ... 159, **160**
  progrediens ... 160
  stygius ... 160
hildebrandtii, Mus ... 94
  Rattus ... 67, 92, **94**, 95
hildegardæ, Zelotomys ... 55
hildegardeæ, Mus ... 55
  Zelotomys ... **55**, 56
hindei, Beamys ... **112**, 113
  Epimys ... 72
  Lophiomys ... **38**, 39
  Mus ... 72
  Rattus ... 66, 67, **72**, 74
house mouse ... 95
hypoxanthus, Œnomys ... 63
hystrella, Acomys ... 116, 119
Hystricidæ ... 162
Hystrix ... **162**
  africæaustralis ... 162
  ambigua ... 162
  conradsi ... 162
  cristata ... 162
  galeata ... **162**
  lademanni ... 162
  lönnbergi ... 162
  prittwitzi ... 162
  somalensis ... 162
  stegmanni ... 162
ibeanus, Lophiomys ... **38**, 39
  Tachyoryctes ... 43, **44**, 47
  Thamnomys ... **58**, 60
iconica, Tatera ... 30, 31, 34

Page.
ignitus, Acomys ... 116, 119
imhausii, Lophiomys ... 36
incomtus, Dasymys ... 122
indicus, Tatera ... 28
insignis, Dendromus ... 48, 51
  Dendromys ... 48
  Thamnomys ... 62
internus, Graphiurus ... 154
Introduction ... 1
iridescens, Pelomys ... 125, 126
irroratus, Otomys ... 146, 149
isabellinus, Lepus ... 164, 166
isiolæ, Saccostomus ... 114, 115
ismailiæ, Epimys ... 87, 88
  Rattus ... 67, 87, 88, 90
isolatus, Graphiurus ... 153, 155, 156
Isomys ... 127
  diminutus ... 146
  testicularis ... 128
jacksoni, Epimys ... 77
  Mus ... 77
  Paraxerus ... 16, 18
  Rattus ... 67, 77, 78
  Sciurus ... 16
jebelæ, Arvicanthis ... 128, 132
johnstoni, Graphiurus ... 152, 155
jujensis, Epimys ... 68, 69
jumping hare ... 156
kahari, Paraxerus ... 16, 19, 20
kaimosæ, Epimys ... 82
  Rattus ... 67, 80, 81, 82
kaiseri, Rattus ... 71, 73, 74, 77
kakumegæ, Lepus ... 167, 169
kapiti, Georychus ... 161
  Heliophobius ... 161
  Myoscalops ... 161
kempi, Acomys ... 116, 117, 120
keniæ, Heliosciurus ... 11, 13
  Sciurus ... 11
kenyensis, Cricetomys ... 104, 105
kijabius, Mus ... 68, 69
  Rattus ... 67, 68
lacustris, Euxerus ... 23, 24
  Xerus ... 24
lademanni, Hystrix ... 162
Lagomorpha ... 164
larvalis, Pedetes ... 157, 158
Lasiomys ... 106
lateris, Heliosciurus ... 14
Leggada bella ... 97
  grata ... 102
  murilla ... 96
  naivashæ ... 95, 96, 99
  sorella ... 103
  triton ... 95, 96
  vicina ... 97
Lemniscomys ... 136, 138
  albolineatus ... 143, 144
  ardens ... 141, 144
  barbarus ... 136, 143, 144
  convictus ... 143, 146
  griselda ... 136, 137, 138
  macculus ... 138, 140
  maculosus ... 136, 137, 138
  massaicus ... 138, 139, 140
  mearnsi ... 137, 138

Page.
Lemniscomys micropus ... 142
  spermophilus ... 139, 141
  striatus ... 140, 144
  zebra ... 143, 144
Leporidæ ... 164
Lepus ... 164, 165
  abbotti ... 165, 166
  capensis ... 164, 165, 168
  crawshayi ... 165, 166, 168
  isabellinus ... 164, 166
  kakumegæ ... 167, 169
  microtis ... 167, 169
  raineyi ... 164, 166, 168
  tigrensis ... 164, 166
  timidus ... 164
  victoriæ ... 165, 167, 168, 169
leucoumbrinus, Euxerus ... 23, 24
  Sciurus ... 24
lineatus, Dendromus ... 50, 53
liodon, Tatera ... 22
littoralis, Thamnomys ... 58, 60
Localities, list of ... 3
lönnbergi, Hystrix ... 162
Lophiomys ... 36, 37, 38, 39, 40
  æthiopicus ... 36, 37
  bozasi ... 37, 39
  hindei ... 38, 39
  ibeanus ... 38, 39
  imhausii ... 36
  testudo ... 37
  thomasi ... 37, 38, 39
Lophuromys ... 106, 107, 108, 110
  afer ... 106
  ansorgei ... 109, 111
  aquilus ... 106, 107, 110
  margarettæ ... 109, 111
  pyrrhus ... 109, 112
  rubecula ... 110
  zena ... 106, 110
loringi, Mus ... 69
  Rattus ... 67, 69, 70
  Thamnomys ... 69
lucifer, Æthosciurus ... 10
luteus, Dipodillus ... 27, 28
lutosus, Thamnomys ... 60, 62
macculus, Arvicanthis ... 138
  Lemniscomys ... 138, 140
macmillani, Thamnomys ... 63
macrocephalus, Tachyoryctes ... 40
macropus, Meriones ... 32
  Tatera ... 32, 35
maculosus, Arvicanthis ... 136
  Lemniscomys ... 136, 137, 138
madogæ, Heliosciurus ... 13, 14
maned rats ... 37
manteufeli, Mus ... 76
  Rattus ... 67, 75, 76
margarettæ, Lophuromys ... 109, 111
marwitzi, Heliosciurus ... 11, 12
massaicus, Arvicanthis ... 139, 142
  Lemniscomys ... 138, 139, 140
  Mus ... 139
Mastomys ... 67, 87, 88, 90, 92
mearnsi, Lemniscomys ... 137, 138
  Saccostomus ... 114, 115

Page.
medicatus, Mus ... 71
    Rattus ... 67, 71, 72, 73
medius, Dasymys ... 123, 125
melanotis, Dendromus ... 48
Meriones macropus ... 32
    robustus ... 36
    stigmonyx ... 25
mesomelas, Dendromus ... 48
mice, harsh-furred ... 106
    spiny ... 116
    tree ... 48
microdon, Euxerus ... 23, 24
    Xerus ... 24
micropus, Arvicanthis ... 139, 141
    Lemniscomys ... 142
microtis, Lepus ... 167, 169
minimus, Mus ... 97, 102
    Nannomys ... 97
moerens, Œnomys ... 64
mole-rats ... 40
    naked ... 159
mombassæ, Tatera ... 29
montanus, Acomys ... 117, 120
mouse, broad-headed ... 55
    fat ... 55
    house ... 95
muansæ, Mus ... 68
multicolor, Heliosciurus ... 14
multimammate rats ... 87
Muridæ ... 48
murilla, Leggada ... 96
    Mus ... 96, 99
murillus, Mus ... 96
murinus, Eliomys ... 153
    Graphiurus ... 152
Mus ... 55, 95, 98, 100
    acholi ... 101, 103
    aquilus ... 106
    arborarius ... 57
    bacchante ... 64
    barbarus ... 144
    bellus ... 97, 100
    centralis ... 71
    cuninghamei ... 89
    dennisæ ... 79
    emesi ... 96, 97, 99
    enclavæ ... 97, 99
    fors ... 96
    fumatus ... 82, 83
    gentilis ... 103
    gondokoræ ... 97, 100
    gratus ... 100, 102
    hildebrandtii ... 94
    hildegardeæ ... 55
    hindei ... 72
    jacksoni ... 77
    kijabius ... 68, 69
    loringi ... 69
    manteufeli ... 76
    massaicus ... 139
    medicatus ... 71
    minimus ... 97, 102
    muansæ ... 68
    murilla ... 96, 99
    murillus ... 96
    musculus ... 95, 103

Mus naivashæ ... 95
    niveiventris ... 82
    noræ ... 72
    peromyscus ... 77
    petilus ... 100, 102
    rattiformis ... 68
    rattus ... 68
    sorella ... 103
    sorellus ... 103
    soricoides ... 101, 103
    suahelicus ... 103
    subfuscus ... 83
    sungaræ ... 101, 102
    tana ... 86
    triton ... 95, 96, 98
    ugandæ ... 88
    verreauxi ... 82
    verroxi ... 82
    vicinus ... 97, 100
    victoriæ ... 89
    voi ... 76
    wamæ ... 101, 103
    zebra ... 144
musculus, Mus ... 95, 103
Mylomys ... 125, 126
    cuninghamei ... 125
    roosevelti ... 127
Myomys ... 66, 67, 82, 83, 84, 86
Myoscalops ... 161
    kapiti ... 161
nairobæ, Arvicanthis ... 130, 131, 134, 138
    Dendromus ... 50
naivashæ, Leggada ... 95, 96, 99
    Mus ... 95
    Tachyoryctes ... 43, 46
naked mole-rat ... 159
Nannomys minimus ... 97
neumani, Epimys ... 89
    Rattus ... 67, 89, 91
neumanni, Arvicanthis ... 131
nigricauda, Rattus ... 69
    Tatera ... 30, 34
nigricaudus, Gerbillus ... 30, 31
nigridius, Dasymys ... 123, 124
nigrifrons, Dendromus ... 53, 54
    Dendromys ... 54
nigrita, Tatera ... 33, 35
nigrofrons, Dendromys ... 54
niloticus, Arvicanthis ... 127
niveiventris, Mus ... 82
noræ, Mus ... 72
    Rattus ... 67, 71, 72, 74
norvegicus, Rattus ... 66
nubilans, Arvicanthis ... 129, 133
nyama, Tatera ... 31, 32, 34
nyansæ, Heliosciurus ... 11, 13
    Sciurus ... 11
nyikæ, Otomys ... 149
oblitus, Thamnomys ... 61, 63
ochraceus, Paraxerus ... 14, 15
    Thamnomys ... 63
ochropus, Dendromus ... 50, 52
ocularis, Graphiurus ... 152
Œnomys ... 63, 64, 65
    bacchante ... 64, 65
    editus ... 64, 65

Page.

- Œnomys hypoxanthus, 63
  - moerens, 64
  - oris, 64
  - unyori, 66
  - vallicola, 65, 66
- orestes, Otomys, 147, 148, 150
- oris, Œnomys, 64
- ornatus, Paraxerus, 15
- orthos, Dasymys, 123, 125
- Orycteropidæ, 169
- Orycteropus, 169
  - æthiopicus, 170
  - afer, 169
- osgoodi, Cricetomys, 105, 106
- Otocyon, 157
- Otomis, 146
- Otomys, 48, 146, 147, 150
  - angoniensis, 149
  - canescens, 149, 151
  - dollmani, 147, 150
  - elassodon, 149, 151
  - elgonis, 148, 151
  - irroratus, 146, 149
  - nyikæ, 149
  - orestes, 147, 148, 150
  - squalus, 147, 148, 150
  - thomasi, 147, 150
  - tropicalis, 147, 149, 150
- Oxymycteris, 106
- pallescens, Arvicanthis, 130, 134
  - Dendromus, 49, 52
- palliatus, Paraxerus, 14, 15
- pallidus, Heliophobius, 161
- panya, Epimys, 89
  - Rattus, 67, 89, 91
- Paraxerus, 14, 17, 18
  - animosus, 19, 20
  - aruscensis, 15, 17, 18
  - augustus, 20
  - boehmi, 14
  - capitis, 16
  - cepapi, 14
  - emini, 14, 15, 17
  - ganana, 16, 19
  - jacksoni, 16, 18
  - kahari, 16, 19, 20
  - ochraceus, 14, 15
  - ornatus, 15
  - palliatus, 14, 15
  - percivali, 19, 20
  - suahelicus, 15, 17
- parvus, Eliomys, 154
  - Graphiurus, 152, 153, 154, 156
- Pedetes, 156, 158
  - cafer, 156
  - currax, 157, 158
  - larvalis, 157, 158
  - surdaster, 156, 157, 158
- Pedetidæ, 156
- Pelomys, 125, 126
  - fallax, 125
  - iridescens, 125, 126
  - roosevelti, 127
- percivali, Acomys, 118, 120
  - Dendromus, 48, 49, 51
  - Dipodillus, 25
- percivali, Paraxerus, 19, 20
  - Tatera, 31, 34
- peromyscus, Epimys, 77
  - Mus, 77
  - Rattus, 67, 77, 78
- personatus, Graphiurus, 154, 155
- petilus, Mus, 100, 102
- phæotis, Arvicanthis, 136
- Phractomys, 36
- pigmy gerbils, 25, 26
- Poemys, 48
- poensis, Æthosciurus, 10
  - Heliosciurus, 9
  - Sciurus, 15
- poliomops, Thamnomys, 58, 59, 60, 62
- porcupine, 162
- pothæ, Tatera, 29, 33, 34
- pouched rats, 112, 114
- præceps, Arvicanthis, 130, 134
- Praomys, 66, 67
- pratensis, Steatomys, 55
- prittwitzi, Hystrix, 162
- progrediens, Heterocephalus, 160
- Protoxerus, 21, 22
  - bea, 21
  - centricola, 21
  - stangeri, 21
- pulchellus, Acomys, 117
  - Arvicanthis, 142
- pumilio, Rhabdomys, 146
- pusillus, Gerbillus, 25
  - Thryonomys, 163
- pyrrhus, Lophuromys, 109, 112
- raineyi, Cricetomys, 103, 104, 105
  - Lepus, 164, 166, 168
- raptor, Graphiurus, 152, 155
- rats, creek, 125
  - giant, 103
  - grass, 128
  - maned, 37
  - mole, 40
  - multimammate, 87
  - pouched, 112, 114
  - rusty-nosed, 63
  - striped grass, 136
  - swamp, 123, 146
  - typical, 67
- rattiformis, Mus, 68
- rattus, Epimys, 68
  - Mus, 68
  - Rattus, 66
- Rattus, 55, 66, 67, 77
  - alexandrinus, 68
  - chrysophilus, 76
  - colonus, 66
  - coucha, 67, 87, 89, 94
  - cuninghamei, 89
  - dennisæ, 67, 79, 80, 82
  - durumæ, 67, 93, 96
  - fumatus, 67, 8[illegible], 84, 86
  - helleri, 67, 7[illegible], 73
  - hildebrandtii, 67, 92, 94, 95
  - hindei, 66, 67, 72, 74
  - ismailiæ, 67, 87, 88, 90
  - jacksoni, 67, 77, 78
  - kaimosæ, 67, 80, 81, 82

Page.
Rattus kaiseri 71,73,74,77
kijabius 67,68
loringi 67,69,70
manteufeli 67,75,76
medicatus 67,71,72,73
neumani 67,89,91
nigricauda 69
noræ 67,71,72,74
norvegicus 66
panya 67,89,91
peromyscus 67,77,78
rattus 66
stella 82
subfuscus 67,83,85,86
taitæ 67,79,80
tana 67,85,86
tinctus 67,89,91
tullbergi 66,77,78
turneri 67,72,74
ugandæ 67,87,88,90
verroxi 82,83
victoriæ 89
voi 67,76
reptans, Arvicanthis 131,135
rex, Tachyorctes 41,43,45
Rhabdomys 146
diminutus 145,148
pumilio 146
Rhizomyidæ 40
Rhizomys annectens 43
splendens 44
robusta, Tatera 35,36
robustus, Meriones 36
Tatera 36
Rodentia 9
roosevelti, Mylomys 127
Pelomys 127
rubecula, Lophuromys 110
rubescens, Arvicanthis 128,129,133
ruddi, Dendromus 50,52,54
Tachyoryctes 41,45
rufifrons, Xerus 22,23
rufobrachiatus, Heliosciurus 11
rusty-nosed rats 63
rutilus, Xerus 22,24
Ruttus 66
ruwenzorii, Æthosciurus 10
Heliosciurus 10,13
Sciurus 10
Saccostomus 114,115
campestris 114
isiolæ 114,115
mearnsi 114,115
umbriventer 114,115
saturatus, Graphiurus 152,153,155
Xerus 22,23
savannus, Dasymys 122,123,124
Sciuridæ 9
Sciurus 9,10
aruscensis 15
centricola 21
cepapi 15
emini 14
ganana 16
jacksoni 16
keniæ 11
Page.
Sciurus leucoumbrinus 24
nyansæ 11
poensis 15
ruwenzorii 10
suahelicus 15
ugandae 14
undulatus 11
vulcanius 10
vulgaris 10
scrub-squirrels 14
semipalmatus, Thryonomys 163
shindi, Heliosciurus 12,13
simoni, Dipodillus 25
smithi, Tatera 32,35,36
somalensis, Hystrix 162
somalicus, Arvicanthis 131
Tachyoryctes 40
sorella, Leggada 103
Mus 103
sorellus, Mus 103
soricoides, Mus 101,103
spalacinus, Tachyoryctes 41,42,46
spalax, Heliophobius 161
spectabilis, Dendromus 53,54
spermophilus, Lemniscomys 139,141
Spermosciurus 22
spiny mice 116
splendens, Rhizomys 44
Tachyoryctes 40
squalus, Otomys 147,148,150
squirrels 9,14,20
giant forest 20
ground 22
scrub 14
stangeri, Protoxerus 20
Steatomys 55
athi 55
pratensis 55
stegmanni, Hystrix 162
stella, Epimys 82
Rattus 82
stigmonyx, Dipodillus 25,26
Meriones 25
storeyi, Tachyoryctes 40
striatus, Arvicanthus 142
Lemniscomys 140,144
striped grass rats 136
stygius, Heterocephalus 160
suahelicus, Mus 103
Paraxerus 15,17
Sciurus 15
subfuscus, Mus 83
Rattus 67,83,85,86
sungaræ, Mus 101,102
surdaster, Pedetes 156,157,158
Thamnomys 57,59
swamp rats 122,146
swinderianus, Aulacodus 163
Thryonomys 163
Tachyoryctes 40, 41, 42,43,45,46
ankoliæ 47,48
annectens 40,48
audax 42,43,46
badius 40
dæmon 44,47
ibeanus 43,44,47

Page.
Tachyoryctes macrocephalus................ 40
naivashæ 43,46
rex........................ 41,43,45
ruddi.......................... 41,45
somalicus...................... 40
spalacinus................. 41,42,46
splendens...................... 40
storeyi........................ 40
taitæ, Epimys..................... 79
Rattus.................... 67,79,80
Tamiscus.......................... 14
emini.......................... 14
tana, Mus......................... 86
Rattus.................... 67,85,86
Tatera................... 28,33,34,36
afra........................... 28
bodessæ........................ 31
böhmi.......................... 28,36
dichrura....................... 36
dumdasi........................ 32,35
emini.......................... 28
iconica................... 30,31,34
indicus........................ 28
liodon......................... 32
macropus....................... 32,35
mombasæ........................ 29
nigricauda..................... 30,34
nigrita........................ 32,35
nyama..................... 31,32,34
percivali...................... 31,34
pothæ..................... 30,33,34
robusta........................ 35,36
robustus....................... 36
smithi.................... 32,35,36
varia..................... 28,35,36
vicina.................... 29,30,33
Taterillus........................ 27,28
emini.......................... 28
Taterona.......................... 28
testicularis, Arvicanthis......... 128,132
Isomys 128
testudo, Lophiomys................ 37
Thamnomys................ 57,58,59,60
discolor....................... 61,62
dolichurus..................... 57
elgonis........................ 62
gazellæ........................ 61,63
gigas.......................... 62
ibeanus........................ 58,60
insignis....................... 62
littoralis...................... 58,60
loringi........................ 60
lutosus........................ 60,62
macmillani..................... 63
oblitus........................ 61,63
ochraceus...................... 63
polionops............... 58,59,60,62
surdaster...................... 57,59
venustus....................... 57
thomasi, Lophiomys............ 37,38,39
Otomys..................... 147,150
Thryonomyidæ...................... 163
Thryonomys........................ 163
gregorianus.................... 164
pusillus....................... 163
semipalmatus................... 163
swinderianus................... 163

Page.
tigrensis, Lepus.................. 164,165
tumidus, Lepus.................... 164
tinctus, Rattus 67,90,91
tree mice......................... 46
Triaulacodus...................... 163
triton, Leggada................... 95,96
Mus....................... 95,96,96
tropicalis, Otomys........... 147,148,150
Tubulidentata..................... 160
tullbergi, Rattus............. 66,77,78
turneri, Epimys................... 73
Rattus.................... 67,73,74
typical rats...................... 67
ugandæ, Epimys.................... 88
Mus............................ 88
Rattus................. 67,87,88,90
Sciurus........................ 14
Uranomys....................... 112
ulæ, Epimys................... 82,83,85
umbriventer, Saccostomus.......... 114,115
undulatus, Heliosciurus....... 11,13,14
Sciurus........................ 11
unyori, Œnomys.................... 66
Uranomys,......................... 112
ugandæ......................... 112
vallicola, Œnomys................. 65,66
varia, Tatera................. 28,35,36
venustus, Thamnomys............... 57
verreauxi, Epimys................. 82
Mus............................ 83
verroxi, Mus...................... 82
Rattus 82,83
vicina, Leggada................... 97
Tatera 29,30,33
vicinus, Gerbillus................ 29
Mus............................ 97,100
victoriæ, Lepus.......... 165,167,168,169
Mus............................ 89
Rattus......................... 89
vinaceus, Zelotomys............... 55,56
virescens, Arvicanthis............ 131,135
voi, Mus.......................... 76
Rattus......................... 67,76
vulcanius, Sciurus................ 10
vulgaris, Sciurus................. 10
wamæ, Mus......................... 101,103
watersi, Dipodillus............... 25,26
Gerbillus...................... 25
whytei, Dendromus................. 49
wilsoni, Acomys................... 118,121
witherbyi, Acomys................. 116
Xeros............................. 22
Xerus......................... 22,23,24
brachyotus..................... 23
dorsalis....................... 24
fulvior........................ 24
lacustris...................... 24
microdon....................... 24
rufifrons...................... 22,23
rutilus........................ 22,24
saturatus...................... 22,23
zebra, Lemniscomys................ 143,144
Mus............................ 144
Zelotomys......................... 55,56
hildegardæ..................... 55
hildegardeæ.................... 55,56
vinaceus....................... 55,56
zena, Lophuromys.................. 106,110

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